

UNITED STATES OF AMERICA:  
WAR DEPARTMENT.

# MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

DECEMBER, 1889.

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1889.

List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the office of the Chief Signal Officer, U. S. Army, Washington City, in time to be used in the preparation of the Monthly Weather Review for December, 1889.

Name of vessel.	Captain.	Name of vessel.	Captain.	Name of vessel.	Captain.
Br. s. s. Abasco	J. Temple.	Br. s. s. Haytian	J. Coward.	Ger. s. s. Scandia	E. Kopf.
Am. Adirondack	J. Sanson.	Dan. Hecla	A. G. Thomson.	Br. Scandinavian	J. Park.
Br. Adriatic	J. G. Cameron.	Br. Helvetia	G. Cochran.	Scythia	T. Roberts.
Alaska	J. W. Morris.	Ger. Hermann	D. Myer.	Seneca	F. Stevens.
Alameda	H. G. Morse.	Br. Hibernian	J. Brown.	Servia	H. Walker.
Alene	G. S. Murray.	Br. Hindoo	Jas. Douglas.	Siberian	R. P. Moore.
Algers	E. J. Seiders.	Holland	Thos. Foote.	Sicilia	W. H. Pridoux.
Am. Allier	F. W. Mason.	Horace	P. Daiziel.	Sif	H. Bentzon.
Ger. Alven	H. Christoffers.	Horrox	T. Henning.	Sirius	T. P. Fisher.
Br. Alvo	David Williams.	Hudson	S. K. Strickland.	Spain	W. A. Griffiths.
Am. America	A. Kohlmann.	Indiana	W. J. Boggs.	State of Alabama	L. S. Lewis.
Dutch. Amsterdam	G. Stenger.	Insistiva	A. Consoneri.	State of Indiana	A. Ritchie.
Br. Anchoria	A. Campbell.	Iowa	E. W. Owens.	State of Nebraska	A. G. Braes.
Anerley	W. T. Sherborne.	Irvington	C. W. Barnard.	State of Nevada	J. A. Stewart.
Angers	James Pinkham.	Island	W. Skjott.	State of Pennsylvania	A. J. A. Mann.
Arabic	W. M. Smith.	Istrian	A. W. Ball.	State of Texas	G. Williams.
Ardaagorm	H. Cameron.	Italy	Thos. Craig.	Stockholm City	W. Thompson.
Arizona	S. Brooks.	Ixia	W. Pearce.	Strabo	A. Matheson.
Athos	H. Low.	Kansas	Wm. Churnside.	Strathairly	D. Broughton.
Aurania	H. McKay.	Knickerbocker	A. Fenton.	Swedia	C. Ludwig.
Australia	F. Sprush.	La Bourgogne	F. Kimble.	Switzerland	J. Ueberweg.
Br. Author	R. Owen.	La Champagne	E. Frangul.	Teutonic	H. Parsell.
Barrowmore	W. H. Moore.	La Flandre	Boyer.	Thanemore	A. J. Baxter.
Bavarian	M. Fitt.	La Gascogne	H. W. Nianes.	The Queen	T. P. Heeley.
Belgenland	R. Weyer.	Lahn	Santelli.	Thingvalla	S. T. H. Laub.
Br. Bellona	J. McMillan.	Lake Huron	H. Hellmers.	Toronto	J. MacAuley.
Benito	L. Santaulari.	Lake Nepigon	P. D. Murray.	Tower Hill	R. P. Bennett.
Benito Estenger	E. F. Canal.	Lake Superior	C. F. Herriman.	Tordenskjold	C. Uchermann.
Bohemia	H. Leithauser.	Lake Winnipeg	Wm. Stewart.	Trave	R. Sander.
Br. Bracadaile	W. Ward.	La Normandie	F. Carey.	Truro City	R. Roope.
Br. Britannia	J. Parazola.	La Platte	Collier.	Ulanda	T. Clark.
Br. Britannic	H. Davison.	Lepanto	J. D. Spooner.	Umbria	W. McKickan.
Br. British Empire	R. Willa.	Lero	H. J. J. Wise.	Veendam	A. Potjer.
Br. British King	John Kelly.	Lianacriere	J. Chisholm.	Venetian	E. Parry.
Br. British Prince	S. Nowell.	Lord Clive	F. H. Evans.	Viola	L. Murray.
Br. British Princess	E. H. Freeth.	Lord Gough	P. Urquhart.	Virginian	W. C. Fry.
Brooklyn City	W. Fitt.	Lord O'Neill	E. M. Hughes.	Werra	H. Bussius.
Br. Buffalo	J. H. Malet.	Louisiana	A. Ferris.	Weser	H. Koch.
Br. Bulgarian	R. Leask.	Ludgate Hill	E. V. Gager.	Westernland	J. C. Jamison.
California	H. T. Garvie.	Main	J. Brown.	Wetherby	J. W. Harrison.
Californian	J. W. Pickthall.	Maine	M. Moller.	Wisconsin	J. P. Worrall.
Canada	J. Robinson.	Manitoba	H. Bocquet.	Wylo	T. Rogers.
Ger. Capna	G. Kueenthal.	Marengo	J. M. Johnston.	Wyoming	C. L. Highy.
Br. Caribbean	H. Daniel.	Marsala	W. Whittom.	United States Naval	
Carroll	G. H. Brown.	Maryland	N. Mass.	U. S. C. S. A. D. Bache	J. F. Moser.
Caspian	A. McDougall.	Mascotte	A. H. Luckhurst.	U. S. F. C. Albatross	Z. L. Tanner.
Catalonia	H. Parsell.	Mathew Bedlington	Jas. Ross.	U. S. S. Alert	Ja. G. Green.
Catania	H. M. Frank.	Mentmore	R. Stainthorpe.	U. S. C. S. G. S. Blake	C. E. Vreeland.
Celtic	E. J. Smith.	Michigan	R. Waite.	U. S. S. Despatch	W. S. Cowles.
Cephalonia	J. B. Watt.	Minia	S. Walters.	U. S. C. & G. S. schr. Earnest	W. N. Jordan.
Am. Chalmette	G. Mason.	Minnesota	S. Trott.	U. S. C. S. schr. Eagle	J. P. Elliott.
Fr. Chateau Lafite	M. C. Olliver.	Montana	R. Griffith.	U. S. S. Endeavor	A. L. Hall.
Br. Chelyria	H. Pence.	Moravia	W. H. Williams.	U. S. S. C. S. Godney	J. M. Helm.
Circassia	J. Harris.	Mount Edgecombe	Winkler.	U. S. C. & G. S. McArthur	D. H. Mahan.
Am. City of Alexandria	J. McIntosh.	Muriel	J. Wetherell.	U. S. S. Minnesota	G. O. Wilts.
Br. City of Augusta	J. W. Catherine.	Neckar	G. S. Locke.	U. S. S. New Hampshire	J. F. Higginson.
Br. City of Berlin	Francis S. Land.	Nederland	H. Suppor.	U. S. S. Ranger	G. C. Reiter.
Am. City of Chester	A. W. Lewis.	Nesamore	E. Benec.	Sailing vessels.	
Br. City of Chicago	A. Redford.	Nestorian	G. Elliott.	Am. bk. Abbie Clifford	D. W. Storey.
Am. City of Paris	J. L. Lockwood.	Nevada	J. France.	bk. Ada P. Gould	W. B. Honrahan.
Am. City of Savannah	F. E. Watkins.	Noordland	J. A. R. Cushing.	Ger. Agnes	H. Hides.
Am. City of Washington	C. B. Googins.	Norseman	H. A. Nickels.	Am. schr. Albert L. Butler	W. Foster.
Br. Colima	J. W. Reynolds.	Northgate	R. Williams.	Ger. sp. Anna	J. Menkens.
Am. Colorado	R. C. Jennings.	Norwegian	W. Ramsdale.	bk. Antares	H. Rahden.
Br. Cornucopia	F. E. Jenkins.	Nueces	W. Christie.	Am. schr. Belle of the Bay	J. W. Emmons.
Br. Crystal	G. Smith.	Nurnberg	Sam Risk.	Br. bgt Bessie May	L. A. Buck.
Cuba	R. E. Stannard.	Obdam	H. Engelbart.	Am. schr. Bloomfield	E. Kinney.
Damara	G. Dixon.	Ocean	G. Bakker.	Ger. bk. Bonito	D. Koch.
Denmark	R. S. Rigby.	Oceanic	A. Voeg.	Br. bk. Bremen	J. C. Eagles.
Devonia	Jno. Craig.	Ohio	C. H. Kempson.	Br. Brunette	H. Striker.
Dupuy de Lome	S. Dechaille.	Ohio	P. L. Moore.	sp. City of Hanhow	J. King.
Br. Durham City	J. A. Jacobsen.	Ohio	H. Winter.	bk. Daisy Boynton	G. Harding.
Br. Earnwell	C. N. Mumford.	Oranmore	W. P. Couch.	bk. Don Justo	J. B. Neilson.
Dutch. Edam	W. Bakker.	Oregon	B. Jones.	schr. Estie H. Lister	S. D. Mason.
Br. Egyptian Monarch	T. M. Irvin.	Orinoco	H. C. Williams.	Florence Randall	J. L. Randall.
Br. Elder	H. Baur.	Othello	J. S. Garvin.	Nor. bk. Fruen	B. Bessens.
Br. Eliza	H. Bernpohl.	Palma	H. Mundy.	Am. bk. Harold C. Beecher	J. E. Nickerson.
Br. El Monte	R. B. Quirk.	Palestine	C. O. Rockwell.	Br. bgt. Hattie Louise	W. H. Barnard.
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Br. Ems	T. Jungst.	Pavonia	J. Ritchie.	schr. Henry Lippett	B. T. Howes.
Br. England	A. F. Heeley.	P. Caland	A. McKay.	bkt. Henry Warner	J. T. Paine.
Br. Enrique	R. de Abertarturi.	Pennland	W. Ponsen.	Br. bk. Herbert C. Hall	G. H. Perry.
Span. Entella	V. Bruno.	Pennsylvania	H. Buschmann.	Am. bk. Isaac Jackson	G. A. Goodwin.
Br. Erato	F. Simmons.	Peruvian	E. B. Thomas.	sp. J. A. Stambler	G. Crystal.
Br. Erin	W. Tyson.	Phoenician	J. W. Wallace.	schr. Jennie S.	Chas. Sinclair.
Br. Euk	T. K. Erham.	Pocasset	John Kerr.	Br. bk. John Gill	A. McKenzie.
Br. Ethiopia	John Wilson.	Polaria	F. Jenkins.	Am. schr. John R. Bergen	W. H. Squires.
Br. Etruria	W. H. P. Hains.	Polynesia	G. Schroder.	bk. John R. Stanhope	J. B. Norton.
Br. Euxaro	Don. Zabalandicochea.	Portin	G. Franck.	bkt. Jose E. More	A. Leonhard.
Br. Exeter City	T. L. Weiss.	Powhatan	F. Ash.	sp. Light vessel No. 45	Andrew Jackson.
Br. Excelsior	H. L. Higgins.	Prinz Maurits	J. Edwards.	schr. Lucia Porter	J. F. Grindel.
Br. Federation	R. Pinkham.	Prinz William I.	A. Sibelasee.	Br. bk. Mable	W. Johns.
Br. Fernando	M. Hetherington.	Professor	H. N. Prins.	Am. bk. Mattea	G. Vidulich.
Br. Forward	S. Gray.	Prussian	G. H. Keller.	Am. schr. Maud H. Dudley	D. W. Oliver.
Br. France	A. D. Hadley.	Rhaetia	J. Ambury.	bkt. Monsita	F. M. Wallace.
Br. Frankfurt	C. Steencken.	Rhein	H. Vogelssang.	schr. Nelson Bartlett	J. B. Watts.
Br. Friesland	W. G. Randle.	Rhenania	W. Kuhlmann.	bk. Neptune	J. F. Hill.
Br. Fulda	R. Ring.	Rhyndland	Schaffer.	Br. schr. Nutwood	M. R. Conroy.
Br. Galitano	F. Goicochea.	Rialto	A. J. Griffin.	Am. bk. Otello	J. J. Bond.
Br. Galileo	W. Magee.	Richmond	J. Akester.	Ger. bk. Pillau	G. Gerlach.
Br. Gallert	C. Kaempff.	Richmond Hill	E. S. Clapp.	bk. Polly Stott	Fritz Harder.
Br. Germanic	M. J. Irving.	Robinia	H. H. Perry.	Br. sp. Rialto	J. M. Getson.
Br. Gilead	M. L. Robinson.	Roman	T. H. Smith.	Am. bk. Richard F. C. Hartley	J. Falker.
Br. Gledowe	O. H. Bommen.	Ross-shire	E. Maddox.	bk. Robert Mowe	W. Peterson.
Br. Glenfield	J. Newdick.	Rotterdam	W. Hewat.	schr. Roger Drury	John Delay.
Br. Gloucester City	H. Norman.	Roxburgh Castle	H. C. v. d. Zee.	Br. bk. Salina	John Peterson.
Br. Gluckauf	B. Jones.	Rugia	A. Turpin.	Am. bk. Sarah	L. R. Hale.
Br. Godfrey	V. Szymanski.	Saale	R. Karlowa.	schr. S. B. Hubbard	A. Mehaffy.
Br. Gothia	W. H. Jamieson.	Sacrobosco	H. Richter.	Dutch. bk. Senator Iken	J. Hohnholts.
Br. Grecian	A. Kahn.	Saint Ronan	H. Gibb.	Fr. bk. Septet	J. B. Hourdel.
Br. Greece	C. E. Le Gallais.	Salerno	H. Campbell.	Am. bk. S. P. Hitchcock	J. B. Nichols.
Br. Hans and Kurt	A. J. Jeffrey.	Samarina	T. Hewitson.	Br. bk. Westaway	Jos. Westaway.
Br. Harrow	Carl Holck.	Santiago	J. B. Allen.	Am. bk. Wm. H. Diets	D. B. Darrab.
	W. Kirton.	Sardinian	W. Richardson.	schr. Wm. Wilson	C. S. Powell.
		Sarnia	J. Gibson.	Br. bk. W. N. H. Clements	R. Churchill.
		Saturnina	F. de Bengoa.	Nor. Ystawa	J. Brunningen.



# UNITED STATES SIGNAL SERVICE

## MONTHLY WEATHER REVIEW.

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No. 12.

### INTRODUCTION.

This REVIEW is based on reports for December, 1889, from 1,928 regular and voluntary observers in the United States and Canada. These reports are classified as follows: 171 reports from Signal Service stations; 118 monthly reports from United States Army post surgeons; 1,266 monthly reports from state weather service and voluntary observers; 25 reports from Canadian stations; 348 marine reports through the co-operation of the Hydrographic Office, Navy Department; marine reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, North and South Dakota,

Illinois, Indiana, Iowa, the Iowa Weather Crop Bulletin Service, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Meteorological Report of the Missouri State Board of Agriculture, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, and Texas, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used. Snow blockades or floods prevented the forwarding of reports of the Central Pacific Railway Company and the rainfall observations of the United States Geological Survey in the southern plateau region in time to be used in this issue of the REVIEW.

### CHARACTERISTICS OF THE WEATHER FOR DECEMBER, 1889.

East of the Rocky Mountains and south of the Great Lakes the current month was the warmest and driest December in the history of the Signal Service, while in parts of southern California the reverse of these conditions obtained and the greatest rainfall and the lowest mean temperature ever noted for December were reported.

The mean temperature for the month was above the average for December, except in the Pacific coast states and adjoining parts of the plateau region. The most marked departures above the average temperature occurred within an area embracing the lower Ohio and middle Mississippi valleys, where they generally exceeded 15°, and where, at Cairo, Ill., and Memphis, Tenn., they amounted to 17°.2. Along the Pacific coast the departures below the average temperature were less than 5°. At fifty-eight out of a total of eighty-nine regular stations of the Signal Service east of the Rocky Mountains having a record of ten years or more, and at the older established stations in New Mexico, Arizona, and Utah, the mean temperature was the highest December mean temperature ever reported, and at forty-one of these stations the absolute maximum temperature was higher than noted for the corresponding month of preceding years. At San Diego, Cal., nineteen years record, the mean temperature was the lowest ever noted for December. Over the country east of the Rocky Mountains the highest mean temperature previously reported for December generally occurred in 1877, except in New York and New England in 1881, in the south Atlantic and east Gulf states in 1879, and in the west Gulf states in 1875 or 1879, and the lowest December mean temperature generally occurred in the Mississippi Valley and eastward in 1876. The highest absolute temperature reported for December, 1889, was 100°, at Simpsonville, S. C., and the absolute minimum temperature was -24°, at Fraser, Colo. The lowest temperature ever reported for December was -59°, at Fort Benton, Mont., in 1880. No damaging frosts were reported for December, 1889, in the south Atlantic and Gulf states, which fact may be attributed to the unusually high temperature in that region.

On the Pacific coast light frost occurred as far south as San Diego, Cal., on several dates.

The precipitation for the current month was the least ever reported for December at stations in Arkansas, Texas, Kansas, Iowa, Tennessee, Virginia, North Carolina, South Carolina, Georgia, and Florida, while at Los Angeles, Cal., the monthly rainfall, 15.80 inches, was the heaviest ever reported for one month at that station. The heaviest precipitation reported for December, 1889, was 29.36 inches, at Upper Mattole, Humboldt Co., Cal., and the precipitation exceeded twenty inches in the eastern Sacramento valley, between the thirty-eighth and fortieth parallels, and in areas along the California coast, north of the thirty-sixth parallel. In areas in east-central Arkansas, western Florida, eastern Georgia, northern Indian Territory, central, south-central, and western Kansas, extreme northwestern Missouri, southeastern Nebraska, extreme southern South Carolina, central Virginia, and east-central Wyoming no precipitation was reported. The greatest excesses in precipitation for December, 1889, occurred on the south Atlantic coast, where more than four times the usual amount of rain for the month fell, and on the middle Pacific coast and over the middle plateau region, where the precipitation was more than double the usual amount for December. The precipitation was also above the average for December over the eastern part of the Dakotas, in the Lake region, and in northern New England, the lower Saint Lawrence valley, and northern New Brunswick. In all districts east of the Rocky Mountains and south of the Lake region, except in the Missouri and upper Mississippi valleys, the precipitation was less than fifty per cent., and on the southeastern slope of the Rocky Mountains less than one per cent. of the usual amount of precipitation for December.

The greatest depth of snowfall reported was eighty-one and one-half inches, at Tuscarora, Nev. In northeastern California and northwestern Wyoming it exceeded sixty inches; in extreme northern Idaho, forty inches; in southwestern Colorado, extreme northern Michigan, and east-central Washington, thirty inches; in northwestern Minnesota, extreme western

Montana, southwestern Utah, and northeastern Wisconsin, twenty inches; and in western Maine, northeastern Massachusetts, southern and central New Hampshire and Vermont, west-central New Jersey, central and east-central New York, eastern Oregon, northeastern South Dakota, north-central Iowa, and east-central Arizona, ten inches. In the Sierra Nevada Mountains the railroads were blockaded for several days by snow, which drifted to a depth of eighteen to twenty-six feet, and in some of the canyons of Ormsby, Washoe, Lander, and Humboldt counties, Nevada, snow was reported packed in depths from twenty to over one hundred feet.

Heavy and continuous rains caused destructive floods in California, Arizona, and southern Nevada. Rivers overflowed their banks, levees broke, and great damage was done to public, railroad, and private property. At Sacramento, on the 12th, the Sacramento River was higher than ever before reported at that place.

The severest storms of the month attended the passage of a low pressure storm from northern Minnesota south of east to the middle Saint Lawrence valley and New England during the 25th and 26th. On the night of the 25th heavy gales, with

rain and snow, prevailed over the Lake region; on the 26th heavy gales continued over the Lake region and on the Atlantic coast north of Hatteras, N. C.; and on the 27th high winds prevailed on the New England coast. Over the middle and western Atlantic Ocean there was an unusual prevalence of severe storms, while over and near the British Isles generally settled weather prevailed.

An unusual and remarkable feature for December was the numerous icebergs reported near the Banks of Newfoundland, where at this season Arctic ice is rarely encountered. Navigation generally closed for the season on Lake Michigan and Lake Superior, and navigation on the Missouri and upper Mississippi rivers was interrupted by ice. Owing to an ice gorge above Davenport, Iowa, the stage of the water in the Mississippi River at that place was the lowest ever noted. Damaging drought was reported in Georgia, North Carolina, eastern Florida, eastern Mississippi, southern Louisiana, and central Iowa. Well-defined auroral displays were reported at Fort Buford, N. Dak., on the 13th; at Hartford, Conn., on the 15th; at Fort Buford, N. Dak., and Leaf River, Ill., on the 26th; and at Fort Maginnis, Mont., on the 27th.

#### ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for December, 1889, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. The difference between the mean pressure for December obtained from observations taken twice daily at the hours named and that determined from hourly observations, varied at the stations named below, as follows: At Boston, Mass., New York City, Philadelphia, Pa., Washington City, Savannah, Ga., Chicago, Ill., Saint Louis, Mo., and Denver, Colo., the mean of the 8 a. m. and 8 p. m. observations was higher by .014, .019, .010, .009, .013, .001, .004, and .002, respectively, than the true mean pressure.

For December, 1889, the mean pressure was highest over the south Atlantic and east Gulf states and northern Florida, where it rose above 30.25, the highest mean reading, 30.28, being noted at Augusta, Ga., and Jacksonville, Fla., respectively. From this region northward and northward there was a gradual decrease in mean pressure to the northern border of the country, where the mean values generally fell below 30.00 east of the one hundred and fifteenth meridian, and where, on the extreme north Pacific coast, they were below 29.85. From the lower valley of the Columbia River there was an increase in mean pressure southward to extreme southern California, where the mean readings were above 30.05. A mean reading of 29.93 at Keeler, Cal., indicated a small area of comparatively low mean pressure in southwestern Nevada and the adjoining part of California.

A comparison of the pressure chart for December, 1889, with that of the preceding month shows that there was an increase in pressure east of a line traced from Michigan southwestward to eastern Texas, and that west of this line there was a general decrease in pressure. The most marked increase in mean pressure occurred in the south Atlantic and east Gulf states, where the mean readings were more than .10 higher than for the preceding month, and the greatest decrease in mean pressure occurred over the eastern part of the middle plateau region, where the mean values were more than .30 lower than for November, 1889. For November, 1889, the area of highest mean pressure occupied an area extending from Colorado northward to southern Idaho, within which the values rose above 30.25, and the mean pressure was lowest in the lower Saint Lawrence valley and in north-central Ontario, where the readings were below 30.00. For the current month the readings within the area of highest mean pressure over the southeastern part of the country corresponded closely with the

highest mean values of the preceding month, noted over the middle plateau region; while the lowest mean readings for December, 1889, noted on the north Pacific coast, were about .15 lower than the lowest mean values for the preceding month, noted in Canada east of the eightieth meridian.

The mean pressure for December, 1889, was above the normal east of a line traced from the eastern extremity of Lake Superior southwestward to central Texas, while to the westward of this line the mean pressure was below the normal, except over the southeastern part of the southern plateau region. The greatest departures above the normal pressure occurred along the south Atlantic and Florida coasts, where they exceeded .10, and the most marked departures below the normal pressure were noted within an area extending from northern Nevada to and along the north Pacific coast, where they were more than .15. The abnormal distribution of mean pressure for the month is referred to in connection with the unprecedentedly high temperature for December, 1889, over the country east of the Rocky Mountains, in a discussion which appears under "Temperature of the air," in this issue of the REVIEW.

#### BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are shown in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. For December, 1889, the monthly ranges were greatest on the coast of extreme eastern New England, where they exceeded 2.10, whence they decreased southward to less than .20 over southern Florida, westward to less than 1.10 in the upper lake region, and the more northern stations in the upper Mississippi valley, whence they increased to more than 1.30 in the Missouri Valley, thence decreased to less than .70 over parts of the northeastern slope of the Rocky Mountains, and thence increased to more than 1.20 near the mouth of the Columbia River. On the Pacific coast the monthly ranges decreased from the Columbia Valley southward to southern California, where they were less than .50. Along the Atlantic coast the extreme monthly ranges varied from .18 at Key West, Fla., to 2.11 at Eastport, Me.; between the eighty-second and ninety-second meridians, .31 at Cedar Keys, Fla., to 1.29 at Manistee, Mich.; between the Mississippi River and the Rocky Mountains, .51 at Brownsville, Tex., to 1.31 at Concordia, Kans.; in the Rocky Mountain and plateau regions, .40 at Fort Grant, Ariz.,



to 1.01 at Walla Walla, Wash.; on the Pacific coast, .43 at San Diego, Cal., to 1.22 at Portland, Oregon.

#### AREAS OF HIGH PRESSURE.

Twelve areas of high pressure have been traced, of which five first appeared north of Montana or North Dakota; one was first located off the north Pacific coast; one off the middle Pacific coast; one off the south Pacific coast; one over the northern plateau region; one over the middle plateau region; one on the middle-eastern slope of the Rocky Mountains; and one in the Missouri Valley. The areas of high pressure which appeared in high latitudes generally moved south of east; those which were first located in the middle latitudes, easterly; and those which apparently developed over the more southern districts passed north of east. The areas generally reached the Atlantic coast north of the thirty-fifth parallel. Two areas of high pressure, one of which first appeared off the middle Pacific coast, and the other over the middle plateau region, moved southward over the eastern part of the Gulf of Mexico after having advanced to the middle-eastern states.

I.—This area was central in Manitoba on the 1st, where it remained, the pressure increasing, until the 2d; it passed over the Lake region on the 3d, over New England on the 4th, and Nova Scotia on the 5th. The temperature fell 16° in North Dakota on the 2d, and from 10° to 20° on the 3d from Minnesota eastward to Maine and southward to Missouri. On the 4th the cold wave extended from Maine to North Carolina. High northwest winds prevailed over the Lake region during the night of the 2d.

II.—The centre of this high area was over the Saskatchewan Valley on the 4th; it moved southeastward over Minnesota, Iowa, Indiana, Ohio, and reached the middle Atlantic coast on the 7th; it then moved northeastward to Nova Scotia. The temperature fell 10° to 14° in the Saskatchewan Valley on the 4th; the fall in temperature extended to the Missouri Valley on the 5th; there was a slight fall in the Lake region and New England on the 6th, which extended over the middle Atlantic states on the 7th. The highest wind velocity reported was forty-eight miles per hour at Nantucket, Mass., on the 6th.

III.—This area passed from the Saskatchewan Valley north of the Lake region to the Gulf of Saint Lawrence between the morning of the 8th and the night of the 10th. The temperature fell 20° to 38° in the Saskatchewan country on the 8th; the fall in temperature extended southward to Kansas, where the fall was 10° to 12°. On the 9th there was a fall of 10° to 14° in the Lake region, which extended the next day over New England. This area, while accompanied by falls in temperature of 10° to 14°, was not of sufficient intensity to reduce the temperature below the normal, except in the extreme northwest.

IV.—An area of high barometer moved eastward from the Pacific coast, and on the 10th was highest in New Mexico and north of Montana. On the 11th the pressure increased .60 of an inch in the Mississippi Valley and .50 in Minnesota and Manitoba. On the 12th the pressure in the northern part of the area decreased, and the centre of high pressure was over the south Atlantic states, where it remained until the 14th. The advance of the high area to New Mexico was accompanied by a slight fall in temperature from the Pacific coast to the Missouri Valley. On the 11th the temperature fell 20° to 26° in Missouri and Arkansas and 12° to 20° in the lower lake region and the Ohio Valley. The fall in temperature on the Atlantic coast was slight. High northwest winds prevailed over the Lake region on the 11th, and on the New England and middle Atlantic coasts on the 11th and 12th.

V.—This area appeared in the Saskatchewan country on the 12th, moved eastward to Manitoba on the 13th, and reached the Saint Lawrence Valley on the 14th. The temperature fell from Montana to Nebraska on the 12th. On the 13th there was a fall of 18° to 26° in Kansas and northern Missouri and of 8° to 12° in the Lake region. The cold wave reached the Atlantic coast on the 14th, the fall in temperature being 14° to 24° in New England and the middle Atlantic

states, with high northeast winds on the coast. The maximum velocities reported were thirty-four miles at Eastport, Me., forty-two miles at Block Island, R. I., and thirty-two miles per hour at New York City.

VI.—An area of high pressure moved eastward from the Pacific coast on the 13th, and on the 14th was central in Kansas, and on the 15th passed from the Ohio Valley to the Virginia coast. The temperature fell 12° to 20° in Kansas on the 14th; it had fallen 12° to 26° in the Ohio Valley on the morning of the 15th, and 14° to 26° in Virginia and North Carolina on the night of the same day.

VII.—This area was central in Idaho on the morning of the 16th and in northern Texas on the 17th. The temperature fell 16° to 18° in the Missouri Valley and 20° to 26° in Kansas and northern Texas on the 17th.

VIII.—The night map of the 18th showed two areas of high barometer, one central off the Pacific coast and the other north of Montana, separated by a trough of low pressure which extended from Idaho to New Mexico. These two areas, though part of the same wave of increasing pressure, remained separated until the morning of the 21st, when they joined in the lower lake region. The centre then moved to the northeast, and was over the Gulf of Saint Lawrence on the 22d. The temperature fell 24° to 42° in North Dakota and northern Minnesota on the 18th. The cold wave extended over the upper lake region, and southward to Missouri and Kansas on the 19th. It moved over the Ohio Valley on the 20th, and reached the Atlantic coast on the 21st, the temperature falling 12° to 18° from Maine to Virginia. High northwest winds prevailed over the lower lake region on the 20th.

IX.—This area was central on the California coast on the 20th, in Kansas on the 21st, in the Ohio Valley on the 22d, on the North Carolina coast on the 23d, and then moved slowly southward to Florida, where it was central on the 25th. The morning map of the 23d showed a fall of 16° to 28° in the Ohio Valley, and the night map of the same date a fall of 12° to 20° in the middle Atlantic states. High northwest winds were reported from the lower lake region on the 22d.

X.—This area was central in Nebraska on the 26th and in Kansas on the 27th. The temperature had fallen 12° to 24° in Nebraska and South Dakota on the morning of the 26th, and 16° to 30° in the lower lake region and the Ohio Valley on the morning of the 27th, and 10° to 16° in New England and the middle Atlantic states for the night of the same date. The falls in temperature accompanied the recovery of pressure that followed the passage of low area xiii, and were not directly connected with the position of the centre of highest pressure.

XI.—This area moved from the north Pacific coast, where it was central on the 28th, to the Missouri valley, and thence eastward over the Lake region to Nova Scotia, where it was central on the 31st. The cold wave accompanying it extended from Manitoba, where the temperature had fallen 44° on the morning of the 29th, southward to Missouri, where the temperature had fallen 22° to 32°. It moved over the Lake region and Ohio Valley, causing a fall in temperature of 30° to 40° by the morning of the 30th. The night map of the 30th showed a fall of 20° to 30° in the middle Atlantic states. On the last day of the month there was a fall of 12° to 20° in the south Atlantic states.

#### AREAS OF LOW PRESSURE.

Fifteen areas of low pressure have been traced, all of which were first located east of the one-hundred and fifteenth meridian, and the low areas traced, with one exception, developed north of the fortieth parallel. The areas of low pressure traced for the current month numbered about five more than the average number traced for the corresponding month of the last sixteen years; they pursued abnormally northern paths; and but two low pressure areas passed off the Atlantic coast, south of the Canadian Maritime Provinces, one of which advanced over New England and the other over New Jersey.

The apparent connection between the unusual number and

course of areas of low pressure, and the unprecedentedly high temperature for December over the middle-eastern and south-eastern part of the country is referred to under "Temperature of the air."

I.—This area was of slight intensity and was not accompanied by precipitation. It passed from northern Minnesota to the Saint Lawrence Valley on the 1st. The temperature rose in advance of the centre from  $10^{\circ}$  to  $20^{\circ}$ .

II.—This low area developed in Nebraska during the night of the 1st and was central in Iowa on the morning of the 2d. It passed across the southern portion of the Lake region, and reached the Atlantic coast on the morning of the 3d. Rain and snow occurred over the Lake region on the 2d; it continued in the lower lake region on the 3d, and extended to southern New England and the northern portion of the middle Atlantic states. The morning map of the 2d showed a decided rise in temperature over all districts east of the Rocky Mountains, and a further rise occurred in the middle and south Atlantic states from the morning of the 2d to the morning of the 3d. High winds occurred over the lower lake region during the night of the 2d.

III.—This area was first located north of Montana on the 3d. It was central in North Dakota on the morning of the 4th; northeast of Lake Superior on the morning of the 5th; was in the Saint Lawrence Valley the night of the 5th; and passed over Nova Scotia on the 6th. In advance of the storm the temperature rose  $10^{\circ}$  to  $14^{\circ}$  in North and South Dakota and western Minnesota on the 3d. On the 4th the rise in temperature extended eastward over the Lake region and southward to Missouri and Kansas. General rains occurred in the upper Mississippi valley, and snow in the upper lake region. The area of general rain extended over the lower lake region to New England on the morning of the 5th. The temperature had risen  $10^{\circ}$  to  $18^{\circ}$  east of the Mississippi River, except in the south Atlantic states, the warm wave reaching these states on the 6th, when the temperature rose  $8^{\circ}$  to  $16^{\circ}$ .

IV.—This area was central in the Saskatchewan Valley on the morning of the 7th. It moved eastward north of the Lake region to the Saint Lawrence Valley, where it was central on the morning of the 9th. Light rains occurred in the upper Mississippi and Ohio valleys on the 7th, and general rains in the lower lake region and New England on the 8th, followed by clearing weather in the lower lake region during the night of the 8th, and in New England on the 9th. Brisk and high winds in advance of the storm were reported from the lakes and the New England coast. The temperature rose in all districts east of the Rocky Mountains on the 7th, and a still further rise of  $10^{\circ}$  to  $20^{\circ}$  occurred over the Lake region and the New England and middle Atlantic states on the 8th, the temperature in these districts reaching a point  $15^{\circ}$  to  $30^{\circ}$  above the average for the month of December.

V.—This disturbance was central in Montana on the morning of the 9th and in Iowa on the 10th. The centre reached the Saint Lawrence Valley on the 11th and passed off to the northeast during the night. On the 9th light rains occurred in Missouri and Illinois, and the temperature rose in the Missouri and upper Mississippi valleys. During the 10th the rain-area extended eastward to include eastern New York and western Pennsylvania, and southward to Tennessee. On this date the warm wave extended over the Lake region and thence southward to Tennessee, the temperature being  $10^{\circ}$  to  $30^{\circ}$  above the normal on the 11th. Rain fell in the lower lake region and in the New England and middle Atlantic states, and the weather cleared in the upper lake region during the night of the 10th. The warm wave reached the Atlantic coast on the morning of the 11th, the temperature ranging  $13^{\circ}$  to  $19^{\circ}$  above the normal from Florida to Maine. Brisk to high winds occurred over the Lake region on the 10th and 11th, and on the New England and middle Atlantic coasts on the 11th and 12th.

VI.—This was a very slight depression that passed during the 12th from Iowa northeastward over the upper lake region. It caused light snow in upper Michigan, and was preceded by

a slight rise in temperature in the lower lake region, the Ohio Valley, Missouri, and Arkansas on the 12th, and in eastern New York and southern New England during night of the 12th.

VII.—This low area was central in western Wyoming on the morning of the 13th, with a trough of low pressure extending southeastward to Kansas. The changes during the day left it as a slight depression central in Missouri. The barometric gradient increased somewhat as it moved into the lower lake region and thence southeastward to the New Jersey coast, and caused high winds on the southern New England coast on the 14th. Rain and snow occurred in the Lake region and snow in New York and New England on the 14th. During the 13th the temperature rose  $8^{\circ}$  to  $10^{\circ}$  in the middle and south Atlantic states and in the Ohio Valley and Tennessee, and there was a further rise of  $4^{\circ}$  to  $10^{\circ}$  in the south Atlantic states, and a fall of  $18^{\circ}$  to  $22^{\circ}$  in the middle Atlantic and New England states on the 14th.

VIII.—This depression was central in South Dakota on the 15th. The centre was in northern Illinois on the night of the 16th, where it remained until the night of the 17th. Rain fell in the Lake region on the 16th, and in New England and the middle Atlantic states on the 17th. The temperature rose during the 14th in North and South Dakota and Nebraska; a further rise occurred in these states on the 15th, and the warm wave extended eastward over the Lake region to New England and southward to include Missouri and Kansas; on the 16th it was over New England and the middle Atlantic states, the lower lake region, the Ohio Valley and Tennessee. The temperature continued to rise on the Atlantic coast during the 17th.

IX.—This low area appeared central north of Montana on the night of the 17th, at the same time low area viii was central in northern Illinois. The latter depression filled up during the night, but, with a slight interruption, the warm wave which had started in advance of it was continued and increased by this low area (number ix) on the 17th. The temperature rose in the Missouri Valley and the northwestern states and territories, and in the Mississippi Valley, and eastward to New England on the following day, except in Ohio, Indiana, and western Pennsylvania, where there had been a slight fall in temperature attending the filling up of depression number viii. On the morning of the 19th the temperature in New England was  $15^{\circ}$  to  $20^{\circ}$  above the normal for the month. Rain fell in the Lake region and the New England and middle Atlantic states on the 18th.

X.—This low area developed from a trough of low pressure that extended from Montana southward to New Mexico on the night of the 18th. On the morning of the 19th the centre was in Kansas, whence it moved to the northeastward, and on the morning of the 20th was central in the lower lake region; it reached the Gulf of Saint Lawrence on the 21st. Snow fell in the Missouri and upper Mississippi valleys on the 19th, and during the 20th the rain and snow area extended over the Lake region to New England. High winds prevailed over the Lake region during the day, and on the New England coast during the night of the 20th. On the morning of the 18th a warm wave extended from North Dakota southward over Nebraska, Kansas, and Texas; during the day it moved eastward to the Mississippi Valley; it reached the Atlantic coast on the 20th, the temperature on that day being  $15^{\circ}$  to  $25^{\circ}$  above the normal from Maine to North Carolina.

XI.—This depression was central in Montana on the 20th. Snow fell during the day in South Dakota, and the temperature rose  $10^{\circ}$  to  $30^{\circ}$  in Minnesota and North Dakota. The storm-centre moved southward to Kansas, and thence to the Lake region on the 21st, and rain fell in Illinois, and snow and rain in Wisconsin and Minnesota, and the warm wave extended over the central valleys and the upper lake region. On the 22d the warm wave reached the Atlantic coast, and rain fell in the lower lake region, the Ohio Valley, and the middle Atlantic and New England states, and high winds were reported from the Lake region and the north Atlantic coast.



XII.—This storm was central in Wyoming on the 23d; it moved eastward to southern Minnesota, thence northward to Lake Superior, and thence eastward, reaching the Gulf of Saint Lawrence on the 25th. The temperature rose 20° in Wyoming and Colorado, and the warm wave extended to the Missouri Valley on the 22d. On the 23d the rise in temperature extended eastward to the Lake region and Ohio valley. On the 24th high southeast to southwest winds, accompanied by rain, prevailed over the Lake region, and the rain-area included the New England and middle Atlantic states.

XIII.—This storm was the most severe one of the month. It appeared first in South Dakota as a depression of very moderate energy on the morning of the 25th. It moved very rapidly to the eastward, reaching the Saint Lawrence Valley the next morning, with greatly increased energy. Heavy gales, with rain and snow, prevailed over the Lake region during the night of the 25th, and the rain-area extended over the New England and middle Atlantic states and Ohio Valley. As the centre moved eastward to the Saint Lawrence Valley the depression deepened, and the barometric gradient in the rear of the storm became very steep. Heavy northwest gales prevailed on the lakes and on the Atlantic coast from Maine to Virginia on the 26th, and on the Atlantic coast with decreased violence on the 27th.

XIV.—This low area was central in northern Colorado on the 27th, and in Iowa on the 28th; it then moved northeastward over the Lake region to the Gulf of Saint Lawrence. Snow fell in Wyoming and Colorado on the 28th; the rain-area was over the Lake region, New England, and the Ohio Valley on the 29th, and extended southwestward to the Gulf States. The rains in the east Gulf states continued on the 30th, and extended into the middle Atlantic states. High northwest winds prevailed on the north Atlantic coast on the 30th. There was a general rise in temperature over the central valleys and the Lake region on the 27th, and a further rise in the same districts on the 28th. The warm wave reached the

Atlantic coast on the 28th, and there was a further rise in temperature in New England and the middle Atlantic states on the 29th.

XV.—This area was central in Montana on the night of the 30th. On the night of the last day of the month it was central in northeastern Colorado. Snow fell in Wyoming and Colorado on the 31st. A warm wave extended over North and South Dakota, Nebraska, and Kansas on the 30th; on the 31st it was over the same districts, and had extended eastward to the Lake region, and southward to the west Gulf states.

Table i exhibits some of the principal features of the areas of high and low pressure. In connection with the areas of high pressure it is shown that they were first observed in the region bounded by the thirty-third and fifty-second parallels and the ninety-eighth and one hundred and twenty-fifth meridians, and last observed from the twenty-ninth to forty-eighth parallels and the sixty-third to one hundred and first meridians; that their average duration was 2.8 days; that their average rate of progression was thirty-five miles per hour; that the maximum abnormal rises in pressure for twelve hours averaged .53 of an inch, which were accompanied by maximum abnormal falls in temperature of 19° for a corresponding period, and a maximum wind velocity averaging forty-one miles per hour.

The data relating to areas of low pressure show that they were first observed in the region bounded by the thirty-eighth and fifty-second parallels and the ninety-fifth and one hundred and thirteenth meridians, and last observed from the thirty-ninth to the fiftieth parallels and the sixty-first to the one hundred and first meridians; that their average duration was 1.7 days; that the average rate of progression of the centres was forty-two miles per hour; that the maximum abnormal falls in pressure in twelve hours averaged .42 of an inch, which were accompanied by maximum abnormal rises in temperature of 17° for a corresponding period, and a maximum wind velocity averaging thirty-five miles per hour.

TABLE I.

Barometer.	First observed.			Last observed.			Duration.	Velocity per hour.	Maximum abnormal changes in pressure in twelve hours, with maximum abnormal changes in temperature and maximum wind velocities in connection therewith.											
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.				Rise.	Station.	Date.	Fall.	Station.	Date.	Miles per hour.	Direction.	Station.	Date.		
High areas.							Days.	Miles.	Inch.											
I.....	1	50	101	44	63	3-5	24	.44	Davenport, Iowa.....	3	18	Springfield, Mo.....	3	36	n.	Green Bay, Wis.....	3			
II.....	4	52	114	48	63	3-5	36	.36	Moorhead, Minn.....	5	16	Bismarck, N. Dak.....	5	26	w.	Manistee, Mich.....	5			
III.....	8	52	112	48	63	2-5	36	.64	Port Arthur, Ont.....	9	16	Duluth, Minn.....	9	28	sw.	Duluth, Minn.....	9			
IV.....	10	37	107	29	84	4-5	23	.52	Milwaukee, Wis.....	11	20	Cairo, Ill.....	11	42	nw.	Grand Haven, Mich.....	11			
V.....	12	52	114	48	76	2-0	35	.50	Montreal, Quebec.....	13	21	Montreal, Quebec.....	13	36	nw.	Northfield, Vt.....	13			
VI.....	14	41	100	38	75	1-5	39	.32	Atlantic City, N. J.....	15	20	Lynchburg, Va.....	15	60	nw.	Block Island, R. I.....	15			
VII.....	16	45	117	36	101	1-0	46	.28	Fort Sill, Ind. T.....	17	16	Norfolk, Va.....	17	10	nw.	Fort Smith, Ark.....	17			
VIII.....	18	51	116	47	64	3-5	35	.64	Oswego, N. Y.....	21	15	Oswego, N. Y.....	21	28	nw.	Albany, N. Y.....	21			
VIII a.....	19	33	119	41	81	1-5	57	.64	Alpena, Mich.....	22	12	Buffalo, N. Y.....	22	72	nw.	Buffalo, N. Y.....	22			
IX.....	20	38	123	29	85	5-0	32	.42	Buffalo, N. Y.....	26	21	Rochester, N. Y.....	26	64	nw.	.....do.....	26			
X.....	26	42	98	38	101	1-0	25	1.08	Rockliffe, Ont.....	30	27	Rockliffe, Ont.....	30	52	nw.	Montreal, Quebec.....	30			
XI.....	28	48	125	46	69	3-5	36	.53	.....	.....	19	.....	.....	41	.....	.....	.....	.....		
Mean.....	45	112	41	77	2-8	35														
Low areas.							Days.	Miles.	Fall.			Rise.								
I.....	1	49	99	50	66	1-0	60	.34	Eastport, Me.....	2	15	Northfield, Vt.....	1	36	sw.	Block Island, R. I.....	2			
II.....	2	42	96	42	87	0-5	42	.28	Cincinnati, Ohio.....	2	10	Indianapolis, Ind.....	2	36	s.	Springfield, Ill.....	2			
III.....	3	51	111	44	61	3-0	36	.44	Parry Sound, Ont.....	5	35	Kingston, Ont.....	5	34	w.	Buffalo, N. Y.....	5			
IV.....	7	52	110	49	67	2-0	41	.34	Kingston, Ont.....	8	12	Rochester, N. Y.....	8	32	s.	Erie, Pa.....	5			
V.....	9	47	112	46	68	2-5	38	.64	Alpena, Mich.....	10	17	Columbus, Ohio.....	10	32	e.	Port Huron, Mich.....	10			
VI.....	12	43	95	46	86	0-5	42	.36	Northfield, Vt.....	13	10	Boston, Mass.....	13	34	sw.	Block Island, R. I.....	13			
VII.....	13	43	110	39	73	1-5	58	.36	Detroit, Mich.....	14	9	Indianapolis, Ind.....	14	42	ne.	Nantucket, Mass.....	14			
VIII.....	15	43	102	41	88	1-5	24	.30	Parkersburg, W. Va.....	16	23	Parkersburg, W. Va.....	16	8	s.	Parkersburg, W. Va.....	16			
IX.....	17	52	108	47	77	1-5	40	.36	Bismarck, N. Dak.....	17	17	Fort Sully, S. Dak.....	17	12	s.	Rapid City, S. Dak.....	17			
X.....	19	38	99	48	65	2-0	41	.30	Cleveland, Ohio.....	20	14	Cleveland, Ohio.....	20	28	ne.	Chicago, Ill.....	20			
XI.....	20	42	108	47	73	2-5	39	.66	Parry Sound, Ont.....	22	16	Erie, Pa.....	22	48	w.	Buffalo, N. Y.....	22			
XII.....	23	43	107	48	64	2-0	46	.56	Marquette, Mich.....	24	17	Detroit, Mich.....	24	34	sw.	Marquette, Mich.....	24			
XIII.....	25	46	103	45	67	1-5	50	.70	Kingston, Ont.....	26	13	Rochester, N. Y.....	26	52	w.	Port Huron, Mich.....	26			
XIV.....	27	41	104	48	65	2-5	33	.68	Montreal, Quebec.....	29	28	Montreal, Quebec.....	29	40	s.	Montreal, Quebec.....	29			
XV.....	30	47	113	41	103	1-0	37	.46	Montrose, Colo.....	31	14	Springfield, Mo.....	31	56	s.	Dodge City, Kans.....	31			
Mean.....	45	105	45	74	1-7	42		.45	.....	.....	17	.....	.....	35	.....	.....	.....	.....		

## NORTH ATLANTIC STORMS FOR DECEMBER, 1889 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during December, 1889, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Thirteen depressions have been traced for December, 1889, the average number traced for the corresponding month of the last six years being 9.8. The greatest number of depressions previously traced for December was thirteen, in 1887, and the least number was seven, in 1884. Of the depressions traced for the current month seven advanced eastward over or near Newfoundland; one moved eastward off the middle Atlantic coast; three first appeared over mid-ocean; and two apparently developed to the eastward of Bermuda. The average path of the depressions was east-northeast until the fortieth meridian was reached when they passed northward or northeastward beyond the region of observation. Over the western portion of the ocean the severest storms of the month occurred on the 5th, when gales of hurricane force and pressure falling below 29.50 (749) were reported east of Bermuda, and on the 12th and 15th, when gales of hurricane force and pressure falling to, or below, 29.00 (737) were reported over, and near, the Banks of Newfoundland. Over mid-ocean gales of hurricane force were reported on the 1st, 13th to 16th, and 24th, and pressure falling below 28.80 (732) was noted on the 16th. Over and near the British Isles the pressure continued high until the 8th; was low from the 9th to 14th, falling to 29.02 (737) at Leith, Scotland, on the 10th; was high from the 15th to 17th; low from the 18th to 24th; and during the balance of the month continued high, except on the 31st, when there was a marked decrease in pressure.

The movements of areas of high pressure over the north Atlantic Ocean during the month were as follows: On the 1st an area of high pressure extended from the Azores westward to the American coast south of Nova Scotia. By the 2d this area had apparently contracted to the westward and southward, and by the 3d had disappeared by a decrease in pressure. During the 4th and 5th the centre of an area of high pressure moved eastward over New England and Nova Scotia and by the 6th united with an area of high pressure which occupied the ocean east of the thirtieth meridian on the preceding date. This area of high pressure continued nearly stationary during the 6th and 7th, on which latter date an area of high pressure moved off the south Atlantic coast, and by the 8th these areas had apparently united, and the pressure was high south of the fiftieth meridian from coast to coast. During the 9th and 10th the pressure decreased over the eastern part of the ocean, and the pressure continued high along the American coast until the 11th, after which the western limit of the area contracted southeastward, and on the 12th the pressure was high over and near the Azores, and an area of high pressure which had advanced eastward over the American continent was central over the south Atlantic states, whence it gradually settled southward over the Gulf of Mexico by the night of the 14th. On the 16th an area of high pressure moved off the American coast and thence eastward, and united with an area of high pressure which occupied the ocean from the British Isles southwest to the Azores. During the 17th and 18th the pressure was high over the entire ocean south of the fiftieth parallel, and during the 19th and 20th the western limit of this area of high pressure contracted southeastward to the Azores. During the 22d an area of high pressure moved eastward over the Canadian Maritime Provinces and thence advanced southeast to the Azores by the 23d, on which latter date an area of high pressure moved off the middle and south Atlantic coasts, and thence slowly eastward to the Azores by the 26th. During the 29th an area of high pressure moved eastward over the Canadian Maritime Provinces and thence southeastward, and at the

close of the month the pressure was high from the twentieth meridian south of the fiftieth parallel to the American coast.

The most notable December storms of tropical or sub-tropical origin noted in the MONTHLY WEATHER REVIEW for preceding years occurred in 1887, when three storms of marked strength appeared in that region. On December 1, 1887, a storm was central about midway between Bermuda and the Windward Islands, whence it moved irregularly northward to the Banks of Newfoundland by the 6th, attended by heavy gales. On the 4th a depression was central east of the Windward Islands, whence it moved northeast and recurved to the northeastward north of the Windward Islands on the 5th. This storm, together with the depression which preceded it, was attended by a heavy "norther" over the West Indies during the first four days of the month, during which many vessels were wrecked. On the 4th, during a violent gale, an immense wave struck the beach at Baracoa, Cuba, broke and flowed inland, destroying nearly three hundred houses and huts without, however, an attendant loss of life. Heavy gales attended the passage of this depression over the ocean during the 6th and 7th. From the 7th to 12th a depression was given a probable track westward over the Caribbean Sea. During the 7th and 8th a heavy "norther," evidently occasioned by this depression, swept over the West Indies, causing much damage to shipping. Probably the most important storm noted for December over the eastern north Atlantic Ocean and the British Isles occurred in 1886. This storm was central south of Nova Scotia on the 2d, and moved thence to the British Isles by the 8th, on which latter date it was central near Aberdeen, Scotland. The fall of the barometer over England was probably without a parallel in the history of that country, the barometric minimum reported being 27.45 (697) at Orme's Head, and a reading of 27.48 (698) was noted at Liverpool. At Leith, Scotland, the barometer fell with great rapidity during the day, reaching 27.65 (702) at 19 hours 30 minutes. This was reported as being by far the lowest barometer reading that occurred at Leith since January 26, 1884, on which date the lowest reading ever made at that place, 27.45 (697), was recorded at 10 p. m.

Compared with the corresponding month of the last six years the weather over the north Atlantic during December, 1889, was unusually stormy over the middle and western parts of the ocean, where the storms, although not equalling in severity some of the more notable December storms of preceding years, were of more frequent occurrence along the trans-Atlantic steamship routes. No storms traversed the ocean from coast to coast, which fact may be attributed to the abnormally high pressure which prevailed over and near the British Isles, where the pressure was nearly two-tenths of an inch above the normal for the month, and whereby the storms were apparently deflected to the northeastward between the twentieth and fortieth parallels.

The following are brief descriptions of the depressions traced for December, 1889:

1.—This depression was central over mid-ocean on the 1st, with pressure below 29.40 (747) and strong to whole gales. By the 2d this depression had advanced east-northeast to the twentieth meridian, without an appreciable loss of energy, after which it disappeared north of the region of observation.

2.—This depression moved eastward over northern Newfoundland and on the 3d was central northeast of Newfoundland, with pressure below 29.20 (742) and strong to whole gales. By the 4th the depression had moved northeast to the thirty-fifth meridian, after which it passed north of the region of observation.

3.—This depression appeared on the 4th south of the Banks of Newfoundland, and had moved slowly eastward by the 5th, attended by fresh to strong gales, after which it probably recurved westward and united with number 4 which had advanced from the southward.



4.—This depression apparently developed east or southeast of Bermuda, where it was central on the 5th, with pressure below 29.50 (749) and gales of hurricane force; moving north-northeast, the depression apparently united with number 5 near Newfoundland after the 6th.

5.—This depression was a continuation of low area iii, which passed southeast over Nova Scotia during the 6th, and thence moved to the north of Newfoundland by the 7th, after which it disappeared north of the region of observation without evidence of marked energy.

6.—This depression moved northeast over mid-ocean north of the fiftieth parallel during the 11th and 12th, with strong to whole gales, and pressure 29.00 (737) on the latter-named date, after which it moved north of the region of observation.

7.—This depression was a continuation of low area v, which was central over New Brunswick the evening of the 11th. From the 12th to 15th the depression moved northeast to the thirtieth meridian, attended by pressure falling to, or below, 29.00 (737) and gales of hurricane force.

8.—This depression was a continuation of low area vii, which moved off the middle Atlantic coast during the 14th, and on the 15th the depression was central about midway between the Grand Banks and Bermuda. On this date gales of hurricane force were reported south of the Banks of Newfoundland, after which the centre of depression apparently moved northeastward, and number 9 was possibly its continuation.

9.—This depression was central over mid-ocean north of the fiftieth parallel on the 16th, with reported barometer readings below 28.80 (732) and gales of hurricane force over a considerable area, after which it disappeared north of the region of observation. While it is possible that this depression was a continuation of number 8, reports at hand will not permit the connection of the paths.

10.—This depression was central northeast of Newfoundland on the 20th, whence it had apparently advanced from the Labrador coast. By the 21st the storm-centre had moved east-northeast to the thirtieth meridian, attended by fresh to strong gales, after which it apparently passed north of the British Isles.

11.—This depression was a continuation of low area x, which moved over the Canadian Maritime Provinces during the 21st. By the 22d the depression had advanced east-northeast to the fortieth meridian, attended by fresh to strong gales, after which it passed northeastward north of the region of observation.

12.—This depression was a continuation of low area xi, which moved eastward over the Canadian Maritime Provinces, and on the morning of the 23d was central southeast of Nova Scotia, in which position the storm showed small energy. By the 24th the storm-centre had passed rapidly east-northeast to the fortieth meridian, with pressure falling below 29.00 (737), and gales of hurricane force. During the 25th and 26th the centre of depression advanced south of east to about the twenty-seventh meridian with a marked loss of strength, after which it moved northeastward beyond the region of observation.

13.—This depression was a continuation of low area xiii, which moved eastward over the Saint Lawrence Valley and Nova Scotia during the 26th, with pressure falling below 28.80 (732). On the morning of the 27th the depression was central near Cape Breton Island, Gulf of Saint Lawrence, with pressure falling to 28.76 (730) at Sydney, and strong to whole gales west of the fortieth meridian. By the 28th the storm-centre had moved east-northeast to the fiftieth parallel, with an apparent loss of energy, after which it disappeared north of the region of observation.

#### OCEAN ICE IN DECEMBER.

The icebergs noted for the current month far exceeded in number those reported for any December during the last seven years. In December, 1889, they were encountered most frequently along the northeast edge of the Banks of Newfoundland, where they were observed on the 6th to 8th, 12th, 13th, 19th, 22d to 24th, 27th, 29th, and 30th, while off the southeast extremity of Newfoundland they were reported on the 6th,

25th, 27th, and 30th. In the corresponding month of 1882, 1883, 1884, 1886, and 1888 no Arctic ice was reported near Newfoundland and the Grand Banks; in 1885 several icebergs were observed off the Newfoundland coast during the latter part of the month, and in 1887 a small iceberg was reported in N. 46° 10', W. 47° 28', on the 26th, and a small iceberg in N. 48° 20', W. 48° 40', on the 28th. This statement shows that since, and including, 1882 there have been but two years in which Arctic ice has been reported for December. The southward drift of numerous icebergs during December, 1889, was, therefore, an unusual and remarkable feature, and indicated abnormally high temperature to the northward of Newfoundland, where at this season ice is usually massed and fixed along the coasts until the higher temperature of spring causes a movement of the Arctic ice sheet along the coasts and a breaking up of the masses of field ice, which as detached bergs and field ice drift southward in the Arctic currents, aided by the prevailing winds.

The following positions of icebergs reported for December, 1889, are shown on chart i by ruled shading:

6th.—N. 48° 51', W. 46° 45', berg two hundred feet long with two pinnacles fifteen feet high, also several detached pieces; N. 48° 28', W. 47° 53', small berg; N. 47° 20', W. 51° 20', medium sized berg about forty feet high.

7th.—N. 48° 44', W. 49° 45', small berg twenty feet high.

8th.—N. 47° 54', W. 48° 13', large berg with two peaks; N. 48° 40', W. 47° 51', small berg about thirty-five feet high and about one hundred and fifty feet long.

12th.—N. 48° 21', W. 46° 20', one large berg; also N. 48° 08', W. 47° 10', one large berg and a few small ones.

13th.—N. 47° 47', W. 46° 58', iceberg about four hundred feet long.

19th.—N. 47° 14', W. 47° 21', large iceberg about one hundred and twenty to one hundred and thirty feet high.

22d.—N. 46° 58', W. 48° 00', berg about fifty feet high.

23d-24th.—N. 46° 36', W. 46° 50', large berg about one hundred feet high; N. 47° 23', W. 43° 45', large berg about sixty feet high.

25th.—N. 47° 11', W. 51° 21', large berg two hundred feet high; N. 46° 48', W. 52° 31', large berg about one hundred and sixty feet high, conical shape.

27th.—N. 48° 10', W. 47° 53', one large and three small bergs; N. 46° 50', W. 52° 20', two bergs and several small pieces, one of the bergs very large.

29th.—N. 47° 55', W. 47° 32', one berg; N. 47° 52', W. 47° 42', one berg.

30th.—N. 46° 09', W. 52° 03', a berg; N. 47° 08', W. 46° 37', one small berg.

#### FOG IN DECEMBER.

The following are limits of fog-areas on the north Atlantic Ocean, west of the fortieth meridian, for December, 1889, as reported by shipmasters:

Date.	Entered.			Cleared.			Date.	Entered.			Cleared.		
	Lat.	N.	Lon. W.	Lat.	N.	Lon. W.		Lat.	N.	Lon. W.	Lat.	N.	Lon. W.
9-10	40	04	60 20	40	42	66 27	19	45	15	48 47	45	02	50 24
9-10	42	30	67 50	42	28	68 20	19	39	00	74 11	37	30	74 31
10	43	30	59 55	43	20	60 40	19-20	44	36	59 21	44	27	60 37
10	41	01	66 15	40	46	67 25	19-20	45	59	49 33	46	30	46 21
10	45	02	51 18	44	40	52 51	27	47	56	48 30	47	29	49 44
10	43	42	52 37	44	01	49 56	30	42	54	63 34	42	38	63 48
19	Sandy Hook.												

The limits of fog-belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on four dates; between the fifty-fifth and sixty-fifth meridians on four dates; and west of the sixty-fifth meridian on three dates. Compared with the corresponding month of the last two years the dates of occurrence of fog near the Grand Banks were eight less than the average; west of the fifty-fifth meridian the dates of occurrence

of fog about corresponded in number with the average of the last two years. Over and near the Grand Banks fog was reported on the 10th, with high barometer and winds mostly from the southeast; and on the 19th, 20th, and 27th, with the advance or passage to the northward of areas of low pressure. Between the fifty-fifth and fifty-sixth meridians fog was reported on the 10th, with high barometer and variable winds; and on the 19th, 20th, and 30th with the passage of areas of low pressure to the northward. West of the sixty-fifth meridian fog was reported on the 9th and 19th, with areas of low pressure central in the Saint Lawrence Valley, and on the 10th, with high pressure and variable winds. Very dense fog prevailed

at New York City, Philadelphia, and Baltimore from the 18th to 20th. At New York City, on the 20th, there were many collisions in the North and East rivers; accidents on the elevated railroads and on the bridge; ocean steamers could not leave their docks, and no vessels entered port. At Philadelphia, navigation was almost suspended on the Delaware River and in the Bay. At Baltimore, navigation was greatly interfered with; vessels were obliged to anchor, and the detention of vessels caused a loss of thousands of dollars. On these dates unsettled weather and rain prevailed, attending the passage of areas of low pressure over the Lake region and the Saint Lawrence Valley.

### TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for December, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

For December, 1889, the mean temperature was highest over extreme southern Florida and in the lower Rio Grande valley, where it was above 70°. On the Atlantic coast south of Savannah, Ga., along the east Gulf coast, over Louisiana, southwestern Arkansas, and a greater part of the eastern half of Texas the mean values were above 60°. The mean temperature for the month was above 50° south of a line traced irregularly westward from southeastern Virginia to extreme northern Texas, and thence southwestward to south-central New Mexico; it was also above 50° south of a line traced from southeastern Arizona northwestward to San Francisco, Cal. The mean temperature was lowest in northern North Dakota, northeastern Montana, and in the British Possessions to the northward, where it fell below 10°. The mean values were below 20° in the Saint Lawrence Valley east of the seventy-second meridian, in northern and extreme western Ontario, and north of a line traced from the north shore of Lake Superior south of west to southern North Dakota, and thence north of west to the region north of extreme western Montana. The mean readings were also below 20° within a limited area in extreme west-central Montana. The mean temperature was below 30° in the upper Saint Lawrence valley, in northern New England, extreme northern New York, in the upper lake region north of the forty-fifth parallel, and north of a line traced thence westward to southwestern South Dakota, thence northwest to central Montana, thence southward to central Utah, thence northwestward to west-central Idaho, thence southwest to extreme northeastern California, and thence irregularly northward to north-central Washington. The mean readings were also below 40° within a limited area in south-central Colorado.

The mean temperature for December, 1889, was above the normal, except in the Pacific coast states, western Montana, northern Idaho, and western Nevada. Sacramento, Cal., was the only Signal Service station on the Pacific coast where the mean temperature was above the normal, and the excess at that place was but 0.5°. The most marked departures above the normal temperature occurred within an area embracing the lower Ohio valley and Tennessee, Arkansas, Missouri, and Iowa, where they generally exceeded 15°, the greatest excess, 17°.2, being reported at Cairo, Ill., and Memphis, Tenn. Along

the Pacific coast the departures below the normal temperature were less than 5°.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.		Below normal.	
Cairo, Ill., and Memphis, Tenn.....	17.2	Olympia, Wash.....	4.4
Des Moines, Iowa.....	15.6	San Diego, Cal.....	3.6
San Antonio, Tex.....	13.0	Red Bluff, Cal.....	3.2
Lynchburg, Va.....	11.6	Winnemucca, Nev.....	2.8
Cheyenne, Wyo.....	8.5	Helena, Mont.....	1.4

### THE HIGH TEMPERATURE OF DECEMBER, 1889.

The remarkable excess of temperature for December, 1889, is exhibited by the following table, which shows that at sixty-five out of a total of eighty-six Signal Service stations east of the Rocky Mountains and south of the upper lake region, and in the middle and southern plateau regions, having a record of ten years, or more, the mean temperature was the highest ever noted for December. The table also gives for the stations named the highest mean temperature previously recorded for December, with the year of occurrence; the excess of temperature for the current month over the highest previous record for December; the annual mean temperature for 1889; and the departures of the annual mean temperature for 1889 from the annual normal temperature:

Station.	Length of record.	Mean temperature, Dec., 1889.	Departure from normal.	Highest previous mean for Dec.	Year of occurrence.	Excess, Dec., 1889.	Annual mean temperature, 1889.	Departure from annual normal.
Boston, Mass.....	19	38.0	+6.0	37.8	1881	0.2	30.7	+3.6
New Haven, Conn.....	18	38.5	+7.8	38.0	1877	0.5	30.6	+3.2
New London, Conn.....	18	40.0	+7.0	39.3	1881	0.7	31.3	+3.0
New York City.....	20	41.4	+7.4	40.7	1881	0.7	33.5	+3.3
Philadelphia, Pa.....	19	43.6	+7.6	41.7	1881	1.9	34.8	+3.7
Atlantic City, N. J.....	17	43.6	+7.6	42.2	1881	1.4	32.3	+3.6
Baltimore, Md.....	18	46.0	+9.0	43.1	1877	2.9	35.8	+3.6
Washington City.....	20	45.6	+9.6	41.8	1877	3.8	35.1	+3.4
Cape Henry, Va.....	16	52.4	+9.4	51.7	1879	0.7	38.9	+3.0
Lynchburg, Va.....	17	50.6	+11.6	46.0	1877	4.6	37.2	+3.3
Norfolk, Va.....	19	51.4	+8.4	50.0	1879	1.4	39.1	+3.1
Charlotte, N. C.....	12	54.7	+10.7	49.1	1879	5.6	50.6	+3.6
Hatteras, N. C.....	10	54.6	+6.6	52.1	1881	2.5	61.2	+0.0
Kitty Hawk, N. C.....	15	54.0	+9.0	53.1	1879	0.9	.....	.....
Wilmington, N. C.....	19	56.0	+7.0	55.6	1879	0.4	62.8	+3.2
Charleston, S. C.....	17	60.0	+9.0	57.9	1879	2.1	65.6	+3.0
Augusta, Ga.....	17	57.4	+9.4	53.9	1879	3.5	64.5	+3.5
Savannah, Ga.....	19	59.8	+6.8	58.5	1879	1.3	65.6	+1.0
Atlanta, Ga.....	12	57.2	+13.2	50.9	1879	6.3	61.1	+3.1
Pensacola, Fla.....	11	62.0	+8.0	58.5	1881	3.5	67.1	+3.6
Mobile, Ala.....	19	61.0	+9.0	57.5	1875	3.5	66.4	+3.3
Montgomery, Ala.....	18	59.1	+10.1	54.4	1875	4.7	65.3	+3.3
Vicksburg, Miss.....	18	63.6	+13.6	50.5	1875	7.1	65.9	+3.5
New Orleans, La.....	20	64.3	+9.3	61.6	1875	2.7	68.8	+3.1
Shreveport, La.....	17	63.2	+13.2	55.3	1875	7.9	65.9	+3.2
Fort Smith, Ark.....	6	57.8	.....	44.1	1883	13.7	61.6	+3.2
Little Rock, Ark.....	11	59.1	+15.1	49.2	1881	9.9	61.6	+3.2
Galveston, Tex.....	19	60.4	+9.4	61.5	1877	4.9	69.3	+1.5
Palestine, Tex.....	8	64.2	.....	53.8	1883	10.4	66.2	+3.5
San Antonio, Tex.....	11	66.0	+13.0	59.0	1879	7.0	67.8	+3.7
Brownsville, Tex.....	15	71.1	+10.1	66.7	1879	4.4	73.0	+3.7
Rio Grande City, Tex.....	12	71.2	+11.2	63.3	1879	7.9	73.6	+3.6
Chattanooga, Tenn.....	11	57.2	+15.2	49.2	1879	8.0	66.4	+3.6



## High temperature of December, 1889—Continued.

Station.	Length of record.	Mean temperature, Dec., 1889.	Departure from normal.	Highest previous mean for Dec.	Year of occurrence.	Excess, Dec., 1889.	Annual mean temperature, 1889.	Departure from annual normal.
Knoxville, Tenn.	19	54.1	+15.1	47.3	1879	6.8	58.2	+0.9
Memphis, Tenn.	17	60.2	+17.2	50.1	1877	10.1	52.2	+1.5
Nashville, Tenn.	20	56.4	+16.4	49.0	1875	7.4	59.1	+0.1
Louisville, Ky.	18	51.6	+13.6	48.5	1877	3.1	56.8	+0.2
Indianapolis, Ind.	16	46.7	+15.7	46.3	1877	0.4	53.1	+0.4
Cincinnati, Ohio.	20	48.2	+13.2	43.6	1875, 1881	4.6	54.8	+0.5
Columbus, Ohio.	12	44.6	+12.6	39.7	1881	4.9	52.2	+0.3
Pittsburgh, Pa.	17	45.6	+11.6	42.5	1877	3.1	53.4	+1.4
Buffalo, N. Y.	17	37.5	+7.5	36.6	1881	0.9	47.1	+0.8
Rochester, N. Y.	19	36.6	+8.6	36.1	1881	0.5	47.3	+0.8
Erie, Pa.	17	40.8	+8.8	40.4	1877	0.4	48.7	+0.0
Cleveland, Ohio.	18	43.0	+12.0	40.4	1877	1.6	49.8	+1.1
Sandusky, Ohio.	13	41.6	+11.6	41.2	1877	0.4	49.9	+0.0
Toledo, Ohio.	19	41.6	+11.6	40.9	1877	0.7	49.8	+0.0
Des Moines, Iowa.	12	39.6	+15.6	35.0	1881	4.6	49.9	+1.6
Cairo, Ill.	18	54.2	+17.2	50.1	1877	4.1	57.9	+0.2
Springfield, Ill.	11	44.4	+13.4	39.9	1881	4.5	52.2	+0.2
Saint Louis, Mo.	19	49.8	+14.8	47.9	1877	1.9	56.0	+0.5
Leavenworth, Kans.	19	45.3	+14.3	44.1	1877	1.2	53.9	+0.9
Omaha, Nebr.	17	39.4	+15.4	38.9	1877	0.5	51.2	+1.9
Fort Sully, S. Dak.	11	27.6	+7.6	37.0	1875	0.6	46.5	+2.4
Yankton, S. Dak.	17	34.4	+14.4	32.8	1881	1.6	48.6	+3.1
Cheyenne, Wyo.	17	36.5	+8.5	34.2	1875	2.3	45.7	+1.5
North Platte, Nebr.	16	37.2	+9.2	34.6	1875	2.6	48.8	+1.2
Denver, Colo.	19	40.5	+7.5	39.1	1881	1.4	50.0	+0.7
Dodge City, Kans.	16	44.6	+13.6	41.0	1875	3.6	54.3	+1.5
Fort Sill, Ind. T.	13	53.8	+13.8	47.0	1877	6.8	60.2	+0.1
Abilene, Tex.	5	59.6	.....	49.4	1885	10.2	63.3	+0.2
El Paso, Tex.	12	53.2	+7.2	49.7	1879	3.5	64.1	+0.8
Santa Fe, N. Mex.	17	39.8	+8.8	34.0	1886	5.8	49.8	+1.7
Fort Apache, Ariz.	12	46.3	+7.3	40.3	1886	6.0	56.2	+3.1
Fort Grant, Ariz.	12	51.6	+5.6	50.8	1886	0.8	61.6	+1.4
Fort Thomas, Ariz.	10	50.3	+7.3	45.5	1883	4.8	64.8	.....
Whipple Barracks, Ariz.	14	42.2	+4.2	40.5	1886	1.7	53.1	+0.6
Salt Lake City, Utah.	16	39.6	+5.6	36.6	1886	3.0	52.7	+1.2

NOTE.—At San Diego, Cal., nineteen years record, the mean temperature, 52° 4, was the lowest ever reported for December; the mean in 1874, 53° 3, being the lowest mean temperature previously reported for the month of December.

The general causes which contributed to produce the unprecedentedly high temperature of December, 1889, over the country east of the Rocky Mountains and south of the upper lake region can be better determined by considering the distribution of pressure, the number and course of low pressure storms, and the prevailing winds for the month. The charted reports show that an area of high pressure occupied the southern states east of the Mississippi River; that the pressure averaged about one-tenth of an inch above the normal in that region; and that there was a decrease in pressure northward to Canada. Reports also show that no low pressure storms traversed the country east of the Mississippi River south of the fortieth parallel, a feature for December without a parallel in the history of the Signal Service, and that there was an unusual prevalence of low pressure storms over and north of the Lake region. It also appears that the prevailing winds were southerly, whereas the normal wind-directions for December in the regions referred to are westerly or north-westerly. It is a fairly well-established fact that low pressure storms are deflected when their advance along the usual paths of storms is intercepted or barred by areas of high pressure. That this effect was produced by the almost continuous presence of areas of high pressure over the Gulf States during December, 1889, can be seen by referring to the chart upon which are plotted the tracks of low pressure storms for that month. The distribution of pressure and the course of low pressure storms combined to cause a drift of the warm air of the Gulf States over the districts to the northward, the abnormal movement of the lower air currents being due to the well-known law that the winds blow from a region of high pressure towards a region of low pressure, and to the recognized fact that there is a large inflow of surface air into low pressure storms.

The centre of the area of highest pressure was in Georgia, and, following the well known law of the circulation of the winds around a centre of high barometer, the prevailing winds east of the Mississippi River and south of a line connecting

New Orleans, La., and Jacksonville, Fla., were from the north; in the west Gulf states and central valleys they were from the south and southwest. This distribution of pressure prevented an indraught of moist air from the Gulf of Mexico over the east Gulf states, and the deficiency of rainfall was greatest in these states. While the winds in the west Gulf states and central valleys were from the south, the slight barometric gradient from the Gulf of Mexico northward over these districts gave rise to a system of air circulation of feeble energy which was, as is usual in such systems, deficient in precipitation, and it was not until north of the parallel of 40°, where the barometric ranges were large, that the rainfall was above the average for the month. The deficiency in moisture and clouds over the central valleys permitted the receipt of an unusual amount of solar radiation, which, added to the excess of temperature produced by the southerly winds, caused in these districts the greatest departures from the normal for the month and higher temperature than ever before recorded for December.

It is proper to note in connection with the abnormal temperature and precipitation conditions east of the Rocky Mountains and south of the upper lake region, that on the Pacific coast a reverse of these conditions obtained, more especially in California, where the precipitation was about three times greater than the average amount for December; where the temperature was below the normal; and where, at San Diego, the mean temperature was the lowest noted for December since the establishment of that station in 1871. The contrasts in temperature and precipitation thus presented in different sections of the country seem to further prove the correctness of the assumptions concerning the causes of the abnormally warm and dry weather in the middle and southern states east of the Rocky Mountains.

In the column showing the year of occurrence of the highest previous mean temperature for December it will be seen that the warmest December over a greater part of the country east of the Rocky Mountains, as shown by Signal Service records, was noted in 1877. In that year the excesses in temperature occurred at a majority of stations from the one hundredth meridian eastward over a greater part of the Lake region, the lower Missouri valley, Indian Territory, northern Arkansas, the Ohio Valley, Virginia, and the District of Columbia. In the south Atlantic states and Florida the warmest previous December was in 1879, and in the Gulf States in 1879 or 1875. In 1877, as in the current year, an area of unusually high pressure occupied the southeastern states in December; the number of low pressure storms was in excess of the average number for the month, numbering the same as for the current month; and but one low pressure storm traced east of the Mississippi River and south of the fortieth parallel reached the Atlantic coast. In December, 1879, very similar barometric conditions prevailed; the low pressure storms were largely in excess of the average number for the month; and but one low pressure storm traversed the country east of the Mississippi River and south of the fortieth parallel. In contradistinction to the instances cited and the apparent causes of abnormally warm Decembers, it is interesting to note in connection with the coldest December in the history of the Signal Service over the eastern part of the country, that of 1876, that an area of unusually high pressure extended over and west of the lower Mississippi valley; that a similar area occupied eastern Dakota; and that three well-defined and energetic low pressure storms traversed the Gulf States.

It is also interesting to note that although the temperature for December, 1889, was largely in excess of the normal, and was higher than ever before recorded for the corresponding month of previous years at a majority of stations in the southern, middle-eastern, and southeastern parts of the country, the departures of the annual mean temperature for 1889 from the annual normal temperature for the stations named were small, and that at a number of stations the mean temperature for the year was below the normal. It will therefore be seen that the average temperature for the year in the sections re-

ferred to corresponded very closely with the normal, and that the unprecedented warmth of December, 1889, to which the small excesses in temperature for the year were principally due, was caused by the abnormal distribution of pressure, the unusual course of low pressure storms, and, incidentally, to the consequent and unusual prevalence of southerly winds over the regions represented by the stations named in the table.

For the year 1889 there has been an average excess in temperature of 39°.5 in the extreme northwest; of 22°.4 on the northeastern slope of the Rocky Mountains; 19°.7 in the Missouri Valley; 19°.4 in the northern plateau region; 18°.4 on the north Pacific coast; 16°.5 in the upper lake region; 16°.4 in New England; 15°.5 in the southern plateau region; 12°.2 on the middle Pacific coast; 10°.6 on the middle-eastern slope of the Rocky Mountains; 9°.1 in the middle plateau region; 8°.1 on the south Pacific coast; 3°.9 in the middle Atlantic states; and 3°.2 in the lower lake region. For this period there was an average deficiency in temperature of 20°.0 in the Florida Peninsula; 9°.5 on the southeastern slope of the Rocky Mountains; 7°.0 in the east Gulf states; 4°.9 in the upper Mississippi valley; 4°.1 on the south Atlantic coast; 3°.0 in the Rio Grande Valley; 2°.5 in the west Gulf states; and 0°.4 in the Ohio Valley and Tennessee. It thus appears that in the upper Mississippi and Ohio valleys and in the south Atlantic and Gulf states, in which regions the current month was the warmest December ever recorded, the annual mean temperature was generally below the normal, while on the Pacific coast, where the mean temperature for December, 1889, was below the normal, the annual mean temperature was above the normal.

#### DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for December for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for December, 1889; (4) the departure of the current month from the normal; (5) and the extreme monthly means for December, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Dec.	(2) Length of record.	(3) Mean for Dec., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for Dec.			
						Highest.	Year.	Lowest.	Year.
<i>Arkansas.</i>		0	Years	0	0	0		0	
Lead Hill .....	Boone .....	37.1	8	55.3	+18.2	55.3	1889	39.1	1884
<i>California.</i>									
Sacramento .....	Sacramento ..	47.0	35	44.1	-2.9	50.9	1861	43.5	1859
<i>Colorado.</i>									
Fort Lyon .....	Bent .....	28.2	20	.....	.....	39.6	1867	17.7	1878
<i>Connecticut.</i>									
Middletown .....	Middlesex .....	28.5	21	36.0	+7.5	36.0	1889	21.8	1872
<i>Florida.</i>									
Morrill's Island ..	Brevard .....	61.3	5	67.7	+6.4	67.7	1889	58.0	1885
<i>Georgia.</i>									
Forsyth .....	Monroe .....	48.9	25	61.3	+12.4	61.3	1889	39.8	1876
<i>Illinois.</i>									
Peoria .....	Peoria .....	28.8	34	43.5	+14.7	44.3	1877	18.5	1876
Riley .....	McHenry .....	22.4	33	30.2	+13.8	37.7	1877	11.1	1876
<i>Indiana.</i>									
Vevay .....	Switzerland ..	34.3	24	40.0	+14.7	49.0	1889	24.6	1876
<i>Iowa.</i>									
Cresco .....	Howard .....	16.3	18	31.3	+15.0	34.0	1877	4.5	1876
Monticello .....	Jones .....	21.3	35	36.9	+15.6	39.5	1877	8.1	1859
Logan .....	Harrison .....	24.6	15	39.6	+15.0	39.6	1889	15.4	1879
<i>Kansas.</i>									
Lawrence .....	Douglas .....	29.8	22	44.8	+15.0	44.8	1889	19.8	1872
Wellington .....	Sumner .....	31.5	16	46.2	+14.7	46.2	1889	23.1	1884
<i>Louisiana.</i>									
Grand Coteau .....	Saint Landry ..	55.1	7	65.0	+9.9	65.0	1889	51.8	1887
<i>Maine.</i>									
Orono .....	Penobscot .....	21.0	19	27.5	+6.5	30.8	1881	13.2	1872
<i>Maryland.</i>									
Cumberland .....	Allegany .....	31.5	30	43.2	+11.7	43.2	1889	24.8	1866
<i>Massachusetts.</i>									
Amherst .....	Hampshire .....	33.8	43	35.7	+1.9	36.0	1881	19.5	1872
Newburyport .....	Essex .....	30.4	11	35.3	+4.9	36.5	1881	25.6	1880
Barnstable .....	Bristol .....	30.2	17	39.0	+8.8	39.0	1889	21.8	1876
<i>Michigan.</i>									
Kalamazoo .....	Kalamazoo .....	28.6	13	40.2	+11.6	40.2	1889	16.7	1876
Thorntonville .....	Lapeer .....	27.0	12	38.0	+11.0	38.0	1889	19.6	1886
<i>Minnesota.</i>									
Minneapolis .....	Hennepin .....	14.7	25	27.5	+12.8	31.6	1877	1.9	1872
<i>Montana.</i>									
Fort Shaw .....	Lewis & Clarke ..	25.3	21	38.2	+12.9	39.7	1875	2.3	1884

#### Deviations from normal temperatures—Continued.

State and station.	County.	(1) Normal for the month of Dec.	(2) Length of record.	(3) Mean for Dec., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for Dec.			
						Highest.	Year.	Lowest.	Year.
<i>New Hampshire.</i>		0	Years	0	0	0		0	
Hanover .....	Grafton .....	20.7	51	26.5	+5.8	31.2	1847	10.2	1872
<i>New Jersey.</i>									
Moorestown .....	Burlington ..	32.2	26	41.0	+8.8	41.0	1889	23.9	1876
South Orange .....	Essex .....	31.6	19	38.6	+7.0	38.6	1889	24.3	1872
<i>New York.</i>									
Cooperstown .....	Otsego .....	27.1	35	32.7	+5.6	33.1	1881	14.7	1876
Palermo .....	Oswego .....	24.7	35	33.7	+9.0	33.7	1889	16.8	1880
<i>North Carolina.</i>									
Lenoir .....	Caldwell .....	37.6	17	48.9	+11.3	48.9	1889	29.1	1876
<i>Ohio.</i>									
N'th Lewisburgh ..	Champaign ..	29.9	57	44.3	+14.4	44.3	1889	19.0	1876
Wauseon .....	Fulton .....	26.6	19	38.8	+12.2	38.8	1877, '89	17.1	1872
<i>Oregon.</i>									
Albany .....	Linn .....	41.8	10	39.0	-2.8	49.5	1886	32.1	1884
Eola .....	Polk .....	40.1	18	36.1	-4.0	47.0	1886, '87	30.7	1884
<i>Pennsylvania.</i>									
Dyberry .....	Wayne .....	25.1	23	33.3	+8.2	33.3	1889	17.3	1876
Grampian Hills ..	Clearfield .....	25.3	25	30.7	+5.4	37.0	1877	16.0	1876
Wellaborough .....	Tioga .....	29.7	10	35.0	+5.3	39.5	1881	22.6	1880
<i>South Carolina.</i>									
Statesburgh .....	Sumter .....	46.6	8	56.6	+10.0	56.6	1889	43.6	1882
<i>Tennessee.</i>									
Austin .....	Wilson .....	39.9	19	56.5	+16.6	56.5	1889	25.0	1876
Milan .....	Gibson .....	38.6	6	56.7	+18.1	56.7	1889	34.2	1886
<i>Texas.</i>									
New Ulm .....	Austin .....	53.6	16	65.8	+12.2	65.8	1889	46.1	1876
<i>Vermont.</i>									
Stratford .....	Orange .....	21.7	16	28.8	+7.1	29.5	1881	13.5	1876
<i>Virginia.</i>									
Birdanest .....	Northampton ..	41.1	21	49.1	+8.0	51.1	1879	32.7	1876
<i>Wisconsin.</i>									
Madison .....	Dane .....	22.1	20	35.0	+12.9	38.7	1877	11.7	1876
<i>Washington.</i>									
Fort Townsend ..	Jefferson .....	41.3	14	37.2	-4.1	45.3	1885	33.0	1884

The above table shows that the mean temperature for the current month was the highest mean temperature ever noted for December at a majority of stations east of the Rocky Mountains and south of the upper lake region, and that at a number of stations in the central valleys the mean temperature of December, 1877, exceeded that of the current month.

#### MAXIMUM AND MINIMUM TEMPERATURES.

The highest maximum temperature reported by a regular station of the Signal Service was 88°, at Rio Grande City, Tex. The maximum values rose to or above 80° in southern and east-central Texas, at New Orleans, La., Jacksonville, Fla., and Fort Supply, Ind. T. The temperature rose to or above 70° south of a line traced from northern Maryland irregularly westward to southwestern Nebraska, thence west of south to southern New Mexico, and thence irregularly westward to southeastern California. On the Pacific coast the maximum temperature rose to or above 60° along the California coast, and, generally, over the southern half of California. The lowest maximum temperature reported was 40°, at Saint Vincent, Minn. The maximum readings were below 50° in extreme eastern New England, south of a line traced irregularly westward from the central upper lake region to southern North Dakota, thence west-northwest to north-central Montana, thence southwestward to east-central Oregon, and thence west of north over Washington, and in east-central Nevada. The reports of United States Army post surgeons and state weather service and voluntary observers show the following maximum temperatures, in states and territories where the temperature was reported 80°, or above: Citronelle and Wiggins, Ala., 82°; Fort Lowell, Ariz., 87°; Oceola, Ark., 83°; Manatee, Fla., 90°; Forsyth, Ga., 82°; Fort Supply, Ind. T., 81°; Elk Falls and Richfield, Kans., 80°; New Iberia, La., 90°; Louisville, Miss., 82°; Weston, Nebr., 80°; Simpsonville, S. C., 100°; and Fort Clark, Tex., 94°. At thirty-nine of the older established stations of the Signal Service east of the Rocky Mountains and south of the forty-fifth parallel, and at Fort Apache, Ariz., and El Paso, Tex., the maximum temperature for the current month was the highest temperature ever reported for December. Among the greater excesses in maximum temperature were Sandusky, Ohio, thirteen years record, where



the maximum temperature, 70°, was 7° above the highest previous maximum reported for December, noted in 1879; Des Moines, Iowa, twelve years record, 69°, 9° above maximum of 1888; and Charlotte, N. C., twelve years record, 76°, 5° above maximum of 1884. At stations in districts east of the Rocky Mountains, except in the Florida Peninsula, the upper lake region, and the extreme northwest, where higher temperatures were noted for preceding Decembers, and not including the stations named above, the excesses in maximum temperature over the highest previous temperature for December were less than 5°. In the upper Mississippi valley and the lower lake region the highest previous maximum temperature generally occurred in 1875 or 1877; elsewhere the periods of occurrence were irregular.

The lowest temperature reported by a regular station of the Signal Service was -21°, at Saint Vincent, Minn. The minimum readings were below -10° in the more northern parts of New Hampshire, Vermont, Minnesota, North Dakota, Montana, and Idaho, and in extreme northeastern Washington, and within a limited area in northeastern South Dakota. The minimum values were below zero in northern New England, northeastern New York, north of a line traced from northern Wisconsin, west-southwest to northwestern Colorado, and thence northwestward to north-central Washington, and within an area extending over northern Nevada and west-central Utah. The highest minimum temperature reported was 63°, at Key West, Fla., and the minimum values were above 40° in Florida, except in the extreme northern part, along the west Gulf coast, and on the immediate Pacific coast from San Francisco, Cal., southward. At Keeler, Cal., five years record, the minimum temperature, 23°, on the 29th, was the same as the lowest reading previously reported for December, noted in 1887; and at Walla Walla, Wash., five years record, the minimum reading, 9°, on the 29th, was 4° below the lowest previous December minimum, noted in 1886.

The reports of United States Army post surgeons, state weather services, and voluntary observers, show the following minimum temperatures in states and territories where the temperature was reported zero, or below: Fraser, Colo., -24°; New Hartford, Conn., -2°; Soda Springs, Idaho, -18°; Eagle Grove, Iowa, -2°; Vesper, Kans., zero; Fairfield, Me., -9°; Monson, Mass., -3°; Lathrop, Mich., -8°; Morris, Minn., -17°; Camp Poplar River, Mont., -17°; Fort Niobrara, Nebr., -14°; West Milan, N. H., -22°; Fort Selden, N. Mex., -9°; Potsdam, N. Y., -8°; Fort Pembina, N. Dak., -20°; Silver Lake, Oregon, -10°; Eagle's Mere and Le Roy, Pa., zero; Webster, S. Dak., -21°; Lunenburg, Vt., -15°; Fort Spokane, Wash., -3°; Butternut, Wis., -14°; and Saratoga, Wyo., -20°. Among extremely low temperatures reported for December of preceding years are: Fort Benton, Mont., -59°, in 1880, and -56°, in 1884; Saint Vincent, Minn., -51°, in 1873, and -48°, in 1884; Fort Assiniboine, Mont., -50°, in 1884; -34° at Duluth, Minn., in 1879, at Huron, S. Dak., in 1884, and at Yankton, S. Dak., in 1879; -39° at Saint Paul, Minn., in 1879; -25° at Denver, Colo., in 1876; -24° at Detroit, Mich., in 1872; -23° at Chicago, Ill., in 1872; -21° at Eastport, Me., in 1884; -20° at Winnemucca, Nev., in 1879, and at Fort Du Chesne, Utah, in 1887; -18° at Fort Stanton, N. Mex., in 1887, at Whipple Barracks [Prescott], Ariz., in 1879, and at Spokane Falls, Wash., in 1884; -17° at Albany, N. Y., in 1875; -15° at Indianapolis, Ind., in 1876; -5° at Charlotte, N. C., in 1880; 1° at Atlanta, Ga., in 1880; 6° at Little Rock, Ark., in 1880; 18° at Brownsville, Tex., in 1880; 22° at Cedar Keys, Fla., in 1880; 24° at Sacramento, Cal., in 1878; and 27° at Fresno, Cal., in 1887.

The lowest absolute temperature for December of preceding years has been generally noted in the middle and south Atlantic, and the east and west Gulf states, in the Rio Grande Valley, and the Ohio Valley and Tennessee, in 1880; in Florida in 1888; and over the northern plateau region, and on the north Pacific coast in 1884; elsewhere the periods of occurrence were irregular.

## LIMITS OF FREEZING WEATHER.

The southern limit of freezing weather for December, 1889, is shown on chart iv by a line traced from the North Carolina coast, at Kitty Hawk, southwestward just inside of the coast line, to Mobile, Ala., thence northwestward to extreme southern Arkansas, and thence southwestward to the Rio Grande River in about longitude west 100°. The western limit of freezing weather is shown by a line traced from south-central Arizona, northwestward over central California to the coast of extreme northern California. Compared with the limits of freezing weather for November, 1889, the line showing the southern limit for the current month is about 12° farther north on the Atlantic coast, and about 5° farther north in the west Gulf states. On the Pacific coast the line of freezing weather is farther west than for the preceding month.

## RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges of temperature occurred in central South Dakota, central Montana, and east-central Kansas, where they equalled or exceeded 70°. From these localities, which were located in the lower and upper Missouri valleys, the monthly ranges decreased to the central upper lake region, where they were less than 40°, thence increased to more than 60° over the interior of New England and east-central New York, and thence decreased to 30° on the extreme southeast coast of New England. From the Missouri Valley the monthly ranges decreased southeastward to less than 20° over extreme southern Florida; southward to less than 30° on the west Gulf coast; southwestward to less than 30° on the south Pacific coast; and westward to 20° on the middle Pacific coast, and to less than 30° on the north Pacific coast.

The following are some of the extreme monthly ranges:

Greatest.		Least.	
Valentine, Nebr.....	71.0	Key West, Fla.....	16.0
Fort Maginnis, Mont.....	71.0	Point Reyes Light, Cal.....	20.0
Northfield, Vt.....	67.0	Astoria, Oregon.....	22.0
Columbia, Mo.....	64.0	Galveston, Tex.....	28.0
Winnemucca, Nev.....	60.0	Grand Haven, Mich.....	39.0

## FROST.

Owing to the unusual warmth of December, 1889, only light frosts occurred in Florida and the Gulf States. As compared with the preceding month the southern limit of frost was nearly two degrees farther north in Florida; about five degrees farther north in Texas; and about two degrees farther south in California. In Florida frost occurred in the interior of the state as far south as the twenty-eighth parallel on the 1st; generally along the immediate Gulf coast east of the ninety-fourth meridian on the 1st and 2d; in east-central Texas to the thirtieth parallel on the 30th and 31st; and in extreme southwestern California on the 8th, 14th, 28th, 29th, and 30th. In the south Atlantic and Gulf states frost was reported most frequently in Georgia, where it was noted for ten dates; in South Carolina for eight dates; in Alabama and Texas for six dates; and in Florida, Louisiana, and Mississippi for four dates. On the Pacific coast frost was reported in California for twenty-one dates; in Oregon for fourteen dates; and in Washington for twelve dates. Frost was reported in seven of the south Atlantic and Gulf states on the 1st and 3d; in six on the 2d; in four on the 4th, 5th, and 12th; in three on the 13th and 14th; in two on the 6th, 11th, and 31st; and in one on the 8th, 16th, 20th to 22d, and 30th. For dates other than those named no frost was reported in the south Atlantic or Gulf states. In California frost was reported on the 3d, 5th, 8th, 10th to 16th, 19th to 21st, 23d, and 25th to 31st; in Oregon on the 4th to 6th, 12th to 16th, and 23d to 28th; and in Washington on the 5th, 6th, 10th to 14th, 21st, 24th, 27th, 28th, and 31st.

## TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for December, 1889:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
Boston, Mass.	43.7	40.0	3.7	41.8	38.0
Canby, Fort, Wash.	50.0	41.5	8.5	46.6	41.2
Cedar Keys, Fla.	76.1	59.4	16.7	66.8	63.4
Charleston, S. C.	61.3	53.1	8.2	57.1	60.0
Eastport, Me.	45.5	40.8	4.7	43.0	38.4
Galveston, Tex.	72.0	60.0	12.0	68.7	66.4
Key West, Fla.	73.8	68.8	5.0	72.1	71.3
Nantucket, Mass.	44.5	38.0	6.5	42.1	39.0
New York City.	44.0	39.6	4.4	42.2	41.4
Portland, Oregon	46.0	37.5	8.5	41.7	38.6

The following table shows the comparative monthly mean air temperature and monthly mean water temperature, at the surface, for the month of December in 1889 and 1876, at Atlantic coast stations having water temperature records for those months. December, 1889, was generally the warmest, and December, 1876, the coldest December on record for the Atlantic states and the districts east of the Mississippi River:

Station.	Mean temperature of the air.		Mean temperature of water.		Excess of temperature in 1889 as compared with 1876.	
	1889.	1876.	1889.	1876.	Air.	Water.
Eastport, Me.	28.4	20.6	43.1	40.2	7.8	2.9
New York City.	41.4	25.1	42.3	32.2	16.3	10.1
Charleston, S. C.	60.0	43.4	57.2	46.7	16.6	10.5
Key West, Fla.	71.3	66.1	72.2	66.5	5.2	5.7

## PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for December, 1889, as determined from the reports of nearly 1,800 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The greatest monthly precipitation reported for December, 1889, was 29.36, at Upper Mattole, Humboldt Co., Cal. The precipitation exceeded twenty inches in the eastern Sacramento valley between the thirty-eight and fortieth parallels, and in areas along the coast of California north of the thirty-sixth parallel, and exceeded fifteen inches at and near Los Angeles, Cal. The destructive floods attending the unusually heavy rainfall in California are referred to under the heading "Floods." The monthly precipitation exceeded ten inches in central Arizona, where 12.38 fell at Strawberry; in east-central Nevada, where 11.12 was reported at Pioche; in southeastern Oregon, where 11.80 was reported at Bandon; and in extreme northwestern Washington, where 12.34 was reported at Neah Bay. East of the Rocky Mountains the greatest monthly precipitation was reported in limited areas in north-central and western New York, where it exceeded six inches. In areas in east-central Arkansas, western Florida, eastern Georgia, northern Indian Territory, central, south-central, and western Kansas, extreme northwestern Missouri, southeastern Nebraska, extreme southern South Carolina, central Virginia, and east-central Wyoming no precipitation was reported. Exclusive of the localities named where no precipitation was reported, less than one-half inch was noted in southeastern Alabama, southeastern Arizona, central and southeastern Colorado, west-central Illinois, southwestern Iowa, extreme southern Louisiana, southern Maryland, District of Columbia, northwestern Mississippi, central and north-central Montana, southern New Jersey, eastern and southern North Carolina, central and southwestern North Dakota, south and southeastern South Dakota, extreme southeastern Pennsylvania, western Tennessee, east-central Utah, eastern West Virginia, and north-central Wisconsin. The precipitation for December, 1889, was below the normal, except on the Pacific coast south of the forty-fourth parallel, over the western part of the plateau region, in eastern North and South Dakota, in the Lake region, and over northern New England, the lower Saint Lawrence valley, and northern New Brunswick, where the precipitation was in excess of the average for the month. The greatest

departures below the normal precipitation were noted on the North Carolina coast, where the deficiency was more than six inches at Hatteras, and at Pensacola, Fla., and on the extreme north Pacific coast, where the precipitation was more than five inches less than the December average. The deficiencies exceeded three inches in northwestern Washington, and south of a line traced from southern New Jersey south of west to extreme southern Missouri, and thence west of south to the central coast of Texas, except in southern Florida where they were less than two inches; and they were more than two inches along the coast of Nova Scotia. The greatest departures above the normal precipitation were noted on the south Pacific coast, where the rainfall exceeded the average for the month by more than twelve inches, whence the excesses diminished northward to the forty-fourth parallel, and eastward to New Mexico and Colorado. In the British Possessions east of the one hundred and twelfth meridian, and in eastern North and South Dakota, Minnesota, the Lake region, northern New England, and the lower Saint Lawrence valley the excesses in precipitation were less than one inch, except on the west Maine coast, in northwestern Minnesota, and extreme western Ontario, where they exceeded one inch, and in the lower Saint Lawrence valley, and on the coast of New Brunswick, where they were more than two inches.

Considered by districts the average percentages of the normal precipitation in districts where the precipitation was in excess of the normal were about as follows: New England, 145 per cent.; lower lake region, 112 per cent.; upper lake region, 122 per cent.; extreme northwest, 134 per cent.; southern plateau, 176 per cent.; middle plateau, 292 per cent.; northern plateau, 118 per cent.; middle Pacific coast, 228 per cent.; south Pacific coast, 420 per cent. In districts where the precipitation was deficient the percentages of the normal were about as follows: middle Atlantic states, 27 per cent.; south Atlantic states and Florida Peninsula, 5 per cent.; east Gulf states, 11 per cent.; west Gulf states, 13 per cent.; Rio Grande Valley, 6 per cent.; Ohio Valley and Tennessee, 46 per cent.; upper Mississippi valley, 62 per cent.; Missouri Valley, 95 per cent.; northeastern slope of the Rocky Mountains, 49 per cent.; middle-eastern slope of the Rocky Mountains, 11 per cent.; southeastern slope of the Rocky Mountains, less than 1 per cent.; and north Pacific coast, 71 per cent. From the above it will be seen that the greatest average excess of precipitation occurred on the south Pacific coast, where more than four times the usual amount of rain fell, and on the middle Pacific coast and in the middle plateau region, where the precipitation was more than double the usual amount for December. The greatest deficiencies are shown on the southeastern slope of the Rocky Mountains, where less



than 1 per cent. of the usual amount of precipitation for the month was reported; and it is shown that in all districts east of the Rocky Mountains and south of the Lake region the precipitation for the month was less than one-half the usual amount for December, except in the upper Mississippi and Missouri valleys.

A summary of precipitation for the several districts for 1889 shows that in New England the total average amount for the year was 49.26, or 3.21 more than the average annual precipitation. In the middle Atlantic states the average amount, 56.68, was 11.85 in excess of the normal. South Atlantic states, 52.63, deficiency, 4.30. Florida Peninsula, 48.01, excess, 1.26. East Gulf states, 48.78, deficiency, 11.44. West Gulf states, 44.42, deficiency, 1.02. Rio Grande Valley, 28.61, deficiency, 1.85. Ohio valley and Tennessee, 39.77, deficiency, 7.55. Lower lake region, 31.74, deficiency, 3.83. Upper lake region, 30.07, deficiency, 4.21. Extreme northwest, 12.92, deficiency, 6.26. Upper Mississippi valley, 29.77, deficiency, 7.12. Missouri Valley, 24.38, deficiency, 3.62. Northern slope, 12.51, deficiency, 3.09. Middle slope, 23.83, excess, 1.46. Southern slope, 23.02, deficiency, 2.11. Southern plateau, 11.58, deficiency, 1.19. Middle plateau, 10.46, deficiency, 1.34. Northern plateau, 14.50, deficiency, 3.70. North Pacific coast, 45.74, deficiency, 13.30. Middle Pacific coast, 32.44, excess, 9.87. South Pacific coast, 25.68, excess, 10.52. The most marked average excesses in precipitation for the year are noted for the south Pacific coast, where the precipitation was about two-thirds, on the middle Pacific coast about one-third, and in the middle Atlantic states about one-fourth greater than the average yearly amount of precipitation; and the most notable deficiencies occurred in the extreme northwest, where about two-thirds, and on the north Pacific coast and in the west Gulf states where about four-fifths of the usual annual rainfall fell.

#### DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for December for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for December, 1889; (4) the departure of the current month from the average; (5) and the extreme monthly precipitation for December during the period of observation and the years of occurrence:

State and station.	County.	(1) Average for the month of Dec.	(2) Length of record.	(3) Total for Dec., 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for December.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
<i>Arkansas.</i>		<i>Inches</i>	<i>Years</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>		<i>Inches</i>	
Lead Hill .....	Boone .....	3.93	8	1.15	-2.78	11.37	1884	1.15	1889
<i>California.</i>									
Sacramento .....	Sacramento ..	4.60	39	8.59	+3.99	13.41	1852	0.00	'50, '76
<i>Colorado.</i>									
Fort Lyon .....	Benf. ....	0.21	17	.....	.....	1.20	1883	0.00	1868
<i>Connecticut.</i>									
Middletown .....	Middlesex ..	3.78	29	3.79	-0.99	7.91	1878	1.20	1875
<i>Florida.</i>									
Merritt's Island ..	Brevard .....	2.69	11	0.00	-2.69	8.55	1888	0.00	1889
<i>Georgia.</i>									
Forsyth .....	Monroe .....	4.76	15	0.79	-3.97	7.56	1887	0.79	1889
<i>Illinois.</i>									
Peoria .....	Peoria .....	2.47	34	1.33	-1.14	7.15	1873	0.28	1876
Riley .....	McHenry .....	2.07	38	1.44	-0.63	5.67	1876	0.28	1857
<i>Indiana.</i>									
Logansport .....	Cass .....	3.44	13	2.50	-0.94	5.99	1881	2.00	1888
Vevay .....	Switzerland ..	3.91	24	2.81	-1.10	7.00	1879	1.16	1888
<i>Iowa.</i>									
Cresco .....	Howard .....	1.37	18	1.33	-0.04	2.83	1879	0.30	1874
Monticello .....	Jones .....	2.43	34	1.35	-0.88	6.99	1850	0.05	1867
Logan .....	Harrison .....	1.43	19	0.14	-1.29	3.10	1868	0.14	1889
<i>Kansas.</i>									
Lawrence .....	Douglas .....	1.71	25	0.06	-1.65	4.39	1873	0.06	1889
Wellington .....	Sumner .....	1.08	10	T.	-1.08	3.14	1884	T.	1889
<i>Louisiana.</i>									
Grand Coteau .....	St. Landry ..	6.16	6	3.75	-2.41	14.43	1884	2.70	1885
<i>Maine.</i>									
Orono .....	Penobscot .....	3.97	19	3.40	-0.57	7.92	1876	1.50	1875
<i>Maryland.</i>									
Cumberland .....	Allegany .....	2.14	18	1.63	-0.51	4.50	1881	0.70	1870

#### Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of Dec.	(2) Length of record.	(3) Total for Dec., 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for December.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
<i>Massachusetts.</i>		<i>Inches</i>	<i>Years</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>		<i>Inches</i>	
Amherst .....	Hampshire ..	3.57	54	2.92	-0.65	7.09	1839	0.96	1838
Newburyport .....	Essex .....	3.89	11	3.52	-0.37	5.80	1886	2.45	1880
Barnstable .....	Bristol .....	3.50	17	2.37	-1.13	5.67	1884	0.82	1875
<i>Michigan.</i>									
Kalamazoo .....	Kalamazoo ..	3.06	13	2.30	-0.76	7.14	1884	1.65	1880
Thornville .....	Lapeer .....	2.48	13	3.09	+0.61	5.25	1879	0.67	1880
<i>Minnesota.</i>									
Minneapolis .....	Hennepin .....	1.58	22	1.26	-0.32	5.30	1873	0.33	1866
<i>Montana.</i>									
Fort Shaw .....	Lewis & Clarke	0.54	19	0.23	-0.32	2.47	1884	0.00	'75, '77
<i>New Hampshire.</i>									
Hanover .....	Grafton .....	2.51	47	2.85	+0.34	5.05	1839	0.78	1875
<i>New Jersey.</i>									
Moorestown .....	Burlington ..	3.21	26	1.01	.....	5.77	1865	0.90	1877
South Orange .....	Essex .....	3.89	19	2.47	-1.42	7.07	1878	0.91	1877
<i>New York.</i>									
Cooperstown .....	Otsego .....	2.58	35	2.68	+0.10	6.02	1881	0.97	1877
Palermo .....	Oswego .....	3.89	35	2.23	-1.66	7.95	1878	1.60	1874
<i>North Carolina.</i>									
Lenoir .....	Caldwell .....	4.00	15	0.50	-3.50	8.70	1877	0.50	1889
<i>Ohio.</i>									
N. Lewisburgh ..	Champaign ..	2.94	17	3.00	+0.06	5.45	1873	1.50	1882
Wauseon .....	Fulton .....	2.36	17	2.87	+0.51	4.32	1879	0.41	1874
<i>Oregon.</i>									
Albany .....	Linn .....	8.82	10	6.58	-2.24	14.21	1887	4.30	1888
Eola .....	Polk .....	5.83	20	5.23	-0.60	11.50	1880	0.84	1876
<i>Pennsylvania.</i>									
Dyberry .....	Wayne .....	2.63	23	2.91	+0.28	5.02	1878	1.20	1874
Grampian Hills ..	Clearfield .....	3.64	19	4.67	+1.03	5.12	1872	1.99	1871
Wellborough .....	Tioga .....	4.80	10	3.93	-0.87	9.57	1881	1.27	1883
<i>South Carolina.</i>									
Statesburgh .....	Sumter .....	3.47	8	0.75	-2.72	5.87	1884	0.75	1889
<i>Tennessee.</i>									
Austin .....	Wilson .....	4.45	19	1.22	-3.23	10.20	1879	0.85	1882
Milan .....	Gibson .....	3.64	6	0.71	-2.93	7.25	1884	0.71	1889
<i>Texas.</i>									
New Ulm .....	Austin .....	4.61	16	0.37	-4.24	16.43	1875	0.37	1889
<i>Vermont.</i>									
Strafford .....	Orange .....	3.28	16	3.00	-0.28	5.90	1878	0.15	1875
<i>Virginia.</i>									
Birdanest .....	Northampton	3.78	20	0.55	-3.23	6.75	1880	0.55	1889
<i>Wisconsin.</i>									
Madison .....	Dane .....	2.03	17	2.33	+0.30	5.73	1884	0.45	1874
<i>Washington.</i>									
Fort Townsend ..	Jefferson .....	2.61	15	2.07	-0.54	5.10	1886	1.14	1879

The above table shows that at stations in Arkansas, Florida, Georgia, Iowa, Kansas, North Carolina, South Carolina, Tennessee, Texas, and Virginia the precipitation for the current month was the least ever reported for December during the respective periods of observation.

#### EXCESSIVE PRECIPITATION.

For December, 1889, monthly precipitation to exceed twenty inches was reported at seven stations in California; and at twenty-two stations in that state, not including those where twenty inches or more were noted, the precipitation exceeded ten inches. Precipitation to exceed ten inches was also reported at three stations in Arizona; at two stations in Oregon; and at one station each in Nevada and Washington. The greatest monthly precipitation, 29.36, was reported at Upper Mattole, Humboldt Co., Cal.

In December of preceding years precipitation to equal or exceed ten inches has been reported most frequently in Oregon, where it has been noted for twenty-five years; in California for twenty-three years; in Washington for fourteen years; in Mississippi for eleven years; in Florida, Louisiana, North Carolina, and Texas for from five to ten years, inclusive; and in Alabama, Arkansas, Georgia, Indiana, Kentucky, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, Ohio, Tennessee, and Virginia for from one to five years, inclusive. In states and territories other than those named precipitation to equal or exceed ten inches has not been reported for December of preceding years. Among the heavier rainfalls reported for December of preceding years are: in California, 20.60, at Fort Miller, in 1852; 28.65, at Fort Gaston, in 1864; 20.55, at Fort Gaston, in 1866; 24.67, at Camp Wright, in 1866; 30.35, at Meadow Valley, in 1866; 22.19, at Fort Gaston, in 1867; 29.03, at Camp Wright, in 1867; 41.95, at Nevada City, in 1867; 23.76, at Shingle Springs, in 1867;

28.39, at Cisco, in 1871; 20.42, at Healdsburg, in 1871; 41.87, at Pilareitos, in 1871; 51.05, at San Andreas, in 1871; 28.88, at Summit, in 1871; 28.91, at Mount Saint Helena, in 1880; 24.34, at Mumford Hill, in 1880; 32.07, at Reed's Camp, in 1880; 21.85, at Vacaville, in 1880; 31.20, at Emigrant Gap, in 1884; 25.05, at Cisco, in 1884; 23.60, at Colfax, in 1884; 33.84, at Mount Hamilton, in 1884; 20.96, at San Rafael, in 1884; 26.26, at Crescent City, in 1885; and 22.60, at Grass Valley, in 1888. In Oregon, 20.00, at Port Orford, in 1853; 20.00, at Port Orford, in 1855; 22.78, at Astoria, in 1857; 22.59, at Block House, in 1858; 21.69, at Fort Stevens, in 1867; 24.73, at Astoria, in 1867; 21.27, at Fort Stevens, in 1880; 20.14, at Portland, in 1882. In Washington, 27.30, at Neah Bay, in 1863; 20.00, at Cathlamet, in 1875; 23.22, at Neah Bay, in 1880; 21.61, at Pysht, in 1886; 30.70, at Neah Bay, in 1886; 25.84, at Tatoosh Island, in 1886; 22.57, at Neah Bay, in 1887. In Texas, 23.03, at Fort Clark, in 1857. In Louisiana, 20.39, at Point Pleasant, in 1884. In Kentucky, 20.12, at Paducah, in 1879. Exclusive of the instances and years cited, precipitation to equal or exceed fifteen inches in December has been reported in Washington for seven years; in Oregon for nine years; in California for five years; in Texas for two years; and in Alabama, Arkansas, Florida, Louisiana, New Hampshire, New York, and North Carolina for one year.

Precipitation to equal or exceed 2.50 inches in twenty-four hours was reported at thirteen stations in California, on the 8th, 10th to 12th, 15th, 20th, 22d, 24th, and 25th; at two stations in Indiana, on the 10-11th; at one station in Alabama, on the 29-30th; and at one station each in Arizona and Utah, on the 6-7th. Among the heavier rainfalls reported for this period were: 4.22 at Upper Mattole, Cal., on the 10th; 3.50 at Los Gatos, Cal., on the 8th; 3.40 at Colegrove, Cal., on the 24th; 4.30, at Los Angeles, Cal., on the 11-12th; 3.75 at Livingston, Ala., on the 29-30th; and 3.08 at Shelbyville, Ind., on the 10-11th.

In December of preceding years precipitation to equal or exceed 2.50 inches in twenty-four hours has been reported most frequently in California and Texas, where it has been noted for twelve years; in Georgia and North Carolina for eleven years; in Florida and Louisiana for ten years; in Alabama, Illinois, Indiana, Kansas, Maryland, Mississippi, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, Virginia, and Washington for from five to nine years, inclusive; and in Arizona, Arkansas, Connecticut, Delaware, District of Columbia, Indian Territory, Iowa, Kentucky, Maine, Massachusetts, Missouri, New Hampshire, New Jersey, New York, Vermont, and Michigan for from one to four years, inclusive. In states and territories other than those named, precipitation to equal or exceed 2.50 inches in twenty-four hours has not been reported for December of preceding years. Among the heavier rainfalls reported for this period in December of preceding years, are: 13.50, at Point Pleasant, La., 19th, 1882; 6.60, at Fort Gaston, Cal., 24-25th, 1883; 6.65, on the 2-3d, and 9.04, on the 23-24th, at Mount Saint Helena, Cal., 1880; 12.15, at Monroe, La., 29-30th, 1884; 6.00, at Fayetteville, N. C., 9-10th, and 20th-21st, 1878; 6.33, at Micco, Fla., 24th, 1888; 8.47, at Yaquina Lighthouse, Oregon, 5-6th, 1887; at Clarksville, Tex., 8.50, 29-30th, 1874, and 8.50, 28-29th, 1876; 6.74, at Lynchburg, Va., 21st, 1884. Exclusive of the instances and years cited, rainfall to equal or exceed five inches for the period given has been reported in Florida for two years, and in Alabama, California, Illinois, Louisiana, Missouri, New York, North Carolina, and Texas for one year.

The only reports of precipitation to equal or exceed one inch in one hour were: one inch in twenty minutes, at Winnebago, Ill., on the 21st, and 2.33 in one hour and fifty minutes at Pasadena, Cal., on the 24th. In December of preceding years precipitation to equal or exceed the rate of one inch in one hour has been reported most frequently in Texas, where it has been noted for five years; in California, Florida, Indiana, Pennsylvania, and Tennessee for two years; and in Alabama, Arkansas, Illinois, Kansas, Louisiana, Massachusetts, Michi-

gan, and Mississippi for one year. In states and territories other than those named precipitation to equal or exceed one inch in one hour has not been reported for December of preceding years. Among the heavier rainfalls reported for this period in December of preceding years are: 1.20, in twenty minutes, at Wellsborough, Pa., 7th, 1884; 1.36, in twenty minutes, at Clarksville, Tex., and 1.36 in twenty minutes, at Galveston, Tex., 28th, 1871.

Table of excessive precipitation, December, 1889.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<i>Alabama.</i>	<i>Inches.</i>	<i>Inches.</i>		<i>Inches.</i>	<i>A. M.</i>	
Livingston (1) .....	3.75	29-30				
<i>Arizona.</i>						
Ash Creek .....	10.22					
Fort Mojave .....	11.27	2-70	6-7			
Strawberry .....	12.38					
<i>California.</i>						
Alcatraz Island .....	13.04					
American Hill .....	21.22	3-00	25			
Anderson .....	18.24	8.69	12			
Do. ....		2-70	25			
Angel Island .....	11.28					
Benicia Barracks .....	11.18					
Berkeley .....	12.59					
Colegrove .....	15.40	3-85	11-12			
Do. ....		3-40	24			
Crescent City .....	20.58					
Eureka .....	12.88					
Fendall .....	15.13					
Fort Gaston .....	13.94					
Fort Mason .....	14.08					
Georgetown .....	22.94	2-96	20			
Grass Valley .....	21.08					
Hydesville .....	12.66					
Iowa Hill .....	21.04					
Jolon .....	11.42					
Julian .....	13.76	2-83	22			
Los Angeles .....	15.80	4-30	11-12			
Do. ....		2-72	24-25			
Los Gatos (1) .....	20.73	3-50	8			
Do. ....		3-30	24			
Mendocino .....	17.21					
National City .....		3-23				
Oakland (1) .....	13.38					
Pasadena .....	17.05			2.33	1 50	24
Presidio of San Francisco .....	13.27					
San Francisco .....	13.81					
Santa Barbara (1) .....	10.64					
Santa Clara .....	10.78					
Steeles .....	11.60					
Upper Mattole .....	29.36	4-22	10			
<i>Illinois.</i>						
Winnebago .....				1.00	0 20	21
<i>Indiana.</i>						
Marengo .....		2-75	10			
Shelbyville .....		3-08	10-11			
<i>Nevada.</i>						
Pioche .....	11.12					
<i>Oregon.</i>						
Randon .....	11.80					
Tillamook .....	10.24					
<i>Utah.</i>						
Losee .....		2-70	6-7			
<i>Washington.</i>						
Neah Bay .....	12.34					
<i>Mexico.</i>						
Punta Banda .....		3-50	15			

Excessive precipitation data received too late for publication in November, 1889, Review.

<i>Georgia.</i>						
Andersonville .....			3.00	2.00		15

Received too late for general discussion of weather for December, 1889.

<i>California.</i>						
Alcade .....	12.50					
Almaden .....	14.11					
Anaheim .....	10.95					
Aptos .....	18.29					
Auburn .....	11.94					
Beaumont .....	11.09					
Castroville .....	11.81					
Calistoga .....	17.67					
Cisco .....	25.57					
Colfax .....	21.85					
Corning .....	10.11					
Delta .....	25.83					
Downey .....	10.44					
Dunsmuir .....	20.58					
El Dorado .....	14.94					
El Verano .....	14.85					
Emigrant Gap .....	20.85					
Felton .....	34.95					



## Reports received too late, etc.—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<i>California—Continued.</i>						
Florence	<i>Inches.</i>	<i>Inches.</i>		<i>Inches</i>	<i>h. m.</i>	
Folsom	13-14					
Fruto	11-25					
Gilroy	10-38					
Glen Ellen	10-21					
Laurel	19-25					
Los Gatos (2)	31-79					
Martinez	19-94					
Menlo Park	11-80					
Monterey	10-85					
Mount Hamilton	11-54					
Napa	13-19					
Newark	12-23					
Newhall	11-96					
Niles	15-70					
Oakland (2)	12-41					
Ontario	12-36					
Pajaro	12-54					
Petaluma	14-12					
Placerville	10-12					
Pleasanton	19-07					
Pomona	10-39					
Puente	11-53					
Redding	15-26					
Rumsey	17-66					
San Fernando	12-07					
San Gabriel	14-40					
San José	14-32					
San Mateo	10-55					
Santa Ana	12-44					
Santa Barbara (2)	12-09					
Santa Cruz	10-33					
Santa Margarita	20-38					
Santa Paula	15-68					
Santa Rosa	16-45					
Shingle Springs	15-94					
Sims	17-35					
South Side	19-85					
Suisun City	10-78					
Summit	10-18					
Tehama	18-50					
Templeton	11-45					
Tropico	10-68					
Vacaville (2)	16-12					
Vina	12-48					
Winters	12-16					
	12-74					
<i>Oregon.</i>						
Gardiner	12-72					

## MAXIMUM RAINFALLS IN ONE HOUR OR LESS.

The following table is a record of the heaviest rainfalls during December, 1889, for periods of five and ten minutes and one hour, as reported by regular stations of the Signal Service furnished with self-registering gauges:

Station.	Maximum fall in—					
	5 min.		10 min.		1 hour.	
	Inch.	Date.	Inch.	Date.	Inch.	Date.
Bismarck, N. Dak.*						
Boston, Mass.	0.05	11, 19	0.08	11, 25	0.13	11
Buffalo, N. Y.	0.03	22	0.05	22	0.15	20
Cincinnati, Ohio	0.15	22	0.25	22	0.45	22
Chicago, Ill.*						
Detroit, Mich.	0.05	21	0.10	21	0.35	21
Galveston, Tex.			0.01	30	0.06	30
Jupiter, Fla.*			0.05	20	0.10	3
Marquette, Mich.*						
New York City			0.03	8	0.07	8
New Orleans, La.						
Norfolk, Va.			0.05	30	0.10	30
Savannah, Ga.†					T.	
San Francisco, Cal.	0.15	21	0.19	21	0.38	21
Saint Louis, Mo.*						
Washington City‡						

\* Record incomplete on account of snow and other causes. † Total for month. ‡ Not sufficient precipitation for gauge to register.

## SNOW (snowfall in inches and tenths.)

The greatest depth of snowfall reported for the month was eighty-one and one-half inches, at Tuscarora, in the east north-central part of Nevada. At Susanville, northeastern California, sixty-four inches were reported. The monthly snowfall equalled or exceeded sixty inches in extreme northwestern Wyoming; forty inches in extreme northern Idaho; thirty inches in southwestern Colorado, extreme northern Michigan,

and east-central Washington; twenty inches in northwestern Minnesota, extreme western Montana, southwestern Utah, and north-central Wisconsin; ten inches in western Maine, north-eastern Massachusetts, southern and central New Hampshire and Vermont, west-central New Jersey, central and east-central New York, eastern Oregon, northeastern South Dakota, north-central Iowa, and east-central Arizona; five inches in western and northwestern Connecticut, and northeastern Pennsylvania; one inch in southeastern Virginia; and less than one inch in northern Illinois, northern Ohio, and eastern Tennessee. On the Atlantic coast measureable snow, trace, fell as far south as southern Virginia; in the central valleys no snow fell south of the fortieth parallel, save trace in eastern Tennessee; in the Rocky Mountain and plateau regions as far south as extreme southeastern Arizona; and in the Pacific coast states as far south as the thirty-eighth parallel in California east of the Sacramento River.

Snowfalls of ten inches or more were reported as follows, and in states and territories where the maximum depth was below that amount, the station reporting the greatest is given: *Arizona*.—Cooley Springs, 11. *California*.—Susanville, 64; Fort Bidwell, 35.4; Georgetown, 33.5; American Hill, 12.5. *Colorado*.—Fort Lewis, 36.2; Fraser, 18.8. *Connecticut*.—Falls Village, 8. *Idaho*.—Soda Springs, 48.5; Fort Sherman, 46.5; Kootenai, 27; Boise City, 10.6. *Illinois*.—Chicago, Hilton, and Oneida, trace. *Indiana*.—La Fayette, trace. *Iowa*.—Eagle Grove, 10. *Maine*.—Lewiston, 11. *Massachusetts*.—Salem, 10. *Michigan*.—Calumet, 30; Sault de Ste. Marie, 27.4; Marquette, 23.7; Lathrop, 17.5; Mio, 17; Grayling, 15.5; Fort Brady, 14.6; West Branch, 13.5; Crystal Falls and Roscommon, 13; Harrisville, 12.5; Ivan, 11. *Minnesota*.—Saint Vincent, 23.6; Duluth, 13.7; Morris, 12; Ortonville, 11. *Montana*.—Sheldon, 20; Virginia City, 17. *Nebraska*.—Alliance and Fort Robinson, 8. *Nevada*.—Tuscarora, 81.5; Belmont, 48; Lewers' Ranch, 43.1; Genoa, 39.6; Carson City a, 35.2; Verdi, 34; Carson City b, 31.4; Virginia City, 29.5; Mill City, 29; Crane's Ranch, 28; Austin and Winnemucca, 26; Elko, 25; Reno, 24.5; Pioch, 22.2; Downeyville, 22; Ely, 18.5; Eureka, 13.4; Beowawe, 12.5; Candelaria, 11.5; Palisade, 11.2. *New Hampshire*.—West Milan, 18; Berlin Mills, 16; Bristol, 14; Belmont, Lake Village, Plymouth and Wiers Bridge, 13; North Conway, 12; Hanover and Manchester a, 11; Manchester b, 10.8; Antrim and Manchester c, 10. *New Jersey*.—Trenton, 10. *New Mexico*.—Chama, 32. *New York*.—Constableville and Queensbury, 10. *North Carolina*.—Soapstone Mount, trace. *North Dakota*.—Fort Pembina, 10.2. *Ohio*.—Cleveland, 0.3. *Oregon*.—Silver Lake, 16.5; Baker City, 11.2. *Pennsylvania*.—Dyberry and Salem Corners, 7. *Rhode Island*.—Pawtucket, 6. *South Dakota*.—Huron, 14.4; De Smet and Spearfish, 12; Wolsey, 11. *Tennessee*.—Jacksboro, trace. *Utah*.—Mount Carmel, 23; Salt Lake City, 15; Levan, 12.8; Mount Pleasant, 11.5. *Vermont*.—Chelsea, 12; Jacksonville and Strafford, 10. *Virginia*.—Mossingford, 1. *Washington*.—Fort Spokane, 36; Spokane Falls, 31.5; Blakeley, 13.5; Walla Walla, 12.1. *Wisconsin*.—Butternut and Grantsburgh, 20; Summit Lake, 15; Green Bay, 13.9; Phillips, 13; Embarras, 11.8; Medford, 11.5; Chippewa Falls, 10. *Wyoming*.—Camp Sheridan, 60.6; Evanston, 34.8; Fort Bridger, 12.

## DEPTH OF SNOW ON GROUND AT CLOSE OF MONTH.

Chart iv shows the depth of snow reported on the ground at the close of the month. In New England snow was reported on the ground in central New Hampshire and central Vermont, where in New Hampshire six inches were reported in the east-central part of the state. Trace, only, was reported in New York, west of the seventy-fifth meridian. The southern limit of trace of snow on the ground west of the eightieth meridian is shown by a line traced from central lower Michigan, south of west to central Colorado, thence southward to central New Mexico, thence west-northwest to the west Sacramento valley in about latitude north thirty-eight degrees, and east of a line continued thence northward over north-central California, and

western Oregon and Washington. In the upper lake region eighteen inches were reported in extreme northern Michigan and north-central Wisconsin; in the Red River of the North valley, sixteen inches at Saint Vincent, Minn.; in South Dakota and northern Nebraska, two to eight inches; in west-central and northwestern Colorado, eight to twenty inches; in the middle and northern plateau regions the amount varied from over forty inches in northeastern Nevada to thirty inches in southeastern Wyoming, to sixteen inches in eastern Washington, to fifteen inches near Carson City, Nev., to twelve inches in southeastern Utah, and in northeastern California a depth of twenty-one inches was reported.

#### HAIL.

Hail was reported during the month as follows: 4th, Cal., Nev. 5th, Md., N. Y., Pa. 6th, N. Y. 8th, Cal. 9th, Wash. 10th, Ill., Ind., Iowa, Kans., Ky., Mich., Mo., N. Y., Ohio, Wis. 11th, and 12th, Cal. 14th, Ind., N. J., N. Y., Ohio,

Pa. 16th, N. C. 18th, Cal., Wash. 19th, Nebr., Oregon, Wash., Wis. 20th, Cal., Oregon. 21st, Cal., Ill., Iowa, Kans., Minn., Mo., Tenn. 22d, Cal., Mass., N. Y. 23d, Mass., Ohio. 24th, Mass., N. Y. 25th, Cal., Mass. 26th, N. Y., Pa. 28th, Iowa, Nebr., S. Dak. 29th, Iowa, Mass. 30th, Md., Ohio, Va. 31st, Iowa, Ohio, Va.

#### SLEET.

Sleet was reported as follows: 1st, Wis. 3d, N. Dak., Pa., S. Dak. 4th, Minn., Wis. 5th, Mich., N. J., N. Y., Ohio, Pa. 6th, Conn., N. J., Vt. 8th, N. Dak., Utah. 9th, N. Dak. 10th, Mass., N. Y., Wis. 11th, Utah, Vt. 13th, Vt. 14th, N. J., Pa., Vt., Wis. 15th, Pa., Vt. 16th, Kans., Minn., N. Dak. 19th, Ill., Iowa, Nebr., Utah, Wis. 20th, Wis. 21st, Iowa, Wash., Wis. 22d, N. H., N. Y., Vt. 23d, Mass. 24th, Conn., Mass. 26th, Conn., N. Y., Vt., Wash. 27th, Utah. 28th, Colo., Minn., Nebr., S. Dak., Wis. 29th, Colo., Iowa, Minn., Oregon, Pa., Tenn., Vt., Wis. 31st, Ariz., Iowa, N. C.

#### WINDS.

The prevailing winds during December, 1889, are shown on chart ii by arrows flying with the wind. In New England, the prevailing winds were from the northwest to west; in the middle Atlantic and east and west Gulf states, the upper Mississippi and Missouri valleys, and over the northern plateau region, southeast to southwest; in the south Atlantic states and on the northeastern slope of the Rocky Mountains, west to southwest; in Florida, northeast to northwest; in the Rio Grande Valley, and on the middle Pacific coast, southeast; in the Ohio valley and Tennessee, and on the southeastern slope of the Rocky Mountains, south to southwest; in the lower lake region, southwest; in the upper lake region, and over the middle plateau region, south to west; in the extreme northwest, north to northwest; on the middle-eastern slope of the Rocky Mountains, south to northwest; on the north Pacific coast, south to southeast; on the south Pacific coast, east to northeast; and over the southern plateau, variable.

#### HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour were reported at regular stations of the Signal Service as follows: 2d, 51, sw., at Wood's Holl, Mass. 6th, 52, sw., at Whipple

Barracks (Prescott), Ariz. 7th, 50, sw., at Whipple Barracks (Prescott), Ariz. 10th, 50, sw., at Lexington, Ky. 14th, 60, ne., at Block Island, R. I. 15th, 54, s., at Whipple Barracks (Prescott), Ariz. 16th, 56, se., at Fort Canby, Wash. 19th, 60, se., at Fort Canby, Wash. 20th, 56, w., at Buffalo, N. Y. 22d, 50, sw., at Port Huron, Mich.; 72, w., at Buffalo, N. Y.; 54, w., at Rochester, N. Y.; and 56, w., at Grand Haven, Mich. 26th, 54, w., at Boston, Mass.; 54, nw., at Block Island, R. I.; 65, w., at Buffalo, N. Y.; 57, w., at Port Huron, Mich.; 54, w., at Harrisburg, Pa.; and 52, w., at Oswego, N. Y. 27th, 60, nw., at Wood's Holl, Mass.; and 50, se., at Fort Canby, Wash. 28th, 60, s., at Dodge City, Kans. 29th, 66, w., at Buffalo, N. Y.; 51, sw., at Grand Haven, Mich.; and 67, sw., at Port Huron, Mich. 31st, 54, s., at Dodge City, Kans.

#### LOCAL STORMS.

Heavy thunder-storms were reported near Cambridge, Ind., on the 11th, and at Buffalo, N. Y., on the 22d. Destructive gales were reported at Jeannette, Pa., on the 11th; over the lower lake region on the 22d; over New England and the lake region on the 26th; on the middle Atlantic and New England coasts on the 27th; at Fort Sully, South Dakota, on the 28th; and at Port Huron, Mich., on the 29th.

#### INLAND NAVIGATION.

##### CLOSING OF NAVIGATION.

*Lake Michigan.*—Grand Haven, Mich.: navigation closed for the season on the 1st, but steamers will run between this port and Milwaukee throughout the winter. Chicago, Ill.: navigation closed for the season on the 15th.

*Green Bay.*—Green Bay, Wis.: navigation was practically closed for the season on the first.

*Lake Superior.*—Duluth, Minn.: navigation closed for the season on the 4th.

*Kennebec River.*—Augusta, Me.: the river froze over on the night of the 3d-4th from this city to Merry Meeting Bay, and reports from Gardiner, Me., stated that the river also froze over at that point.

*Saint Clair River.*—Port Huron, Mich.: the last boats of the season, en route from Chicago to Buffalo, passed this port on the 11th.

*Saint Mary's River.*—Sault de Ste. Marie, Mich.: navigation closed for the season on the 4th.

*Missouri River.*—Yankton, S. Dak.: navigation opened on the 8th. The river froze over on the 28th, closing navigation.

*Mississippi River.*—Saint Paul, Minn.: the ice-gorge in the river disappeared early in the morning of the 8th, and the

channel was clear as far as the eye could reach. A small gorge formed during the night of the 19-20th, and another during the night of the 26-27th. Davenport, Iowa: owing to an ice gorge which formed above this place, the stage of the water on the 1st and 2d, 0.2 and 0.3, respectively, below low-water mark, was the lowest on record, the former lowest mark being zero, in 1878. La Crosse, Wis.: the river was nearly clear of ice on the 2d, and the ferry boat resumed her trips; floating ice 25th to 27th. The ferry boat stopped running on the 29th. The river was frozen over on the 30th, on which date the water was reported the lowest ever known.

#### FLOODS.

Heavy and continuous rains caused destructive floods in California and parts of Nevada and Arizona, and heavy rain caused the rivers at Johnstown, Pa., to rise to a dangerous height on the 14th. On the 12th the Sacramento River at Sacramento, Cal., was the highest ever known, the gauge reading being twenty-six feet eleven and one-half inches; the highest previous reading was twenty-six and six-tenths feet, in February, 1881. The levee opposite Sacramento broke, flooding a great part of Yolo county. Colusa county sustained greater damage than any of the surrounding sections,



on account of the extensive grain fields in that county, which were washed out. At Los Angeles, Cal., the heavy rains previous to the 15th caused considerable damage to the railroads, and the train service of the Southern Pacific and Santa Fé systems was interrupted by washouts. The Southern Pacific Railroad suffered severely on the deserts west of Yuma, Ariz., where a storm of unusual severity prevailed. Traffic was interrupted on the Santa Fé road by land slides in Cajon Pass, and all communication was cut off from San Diego, on the coast line, by washouts. The bridges on the California Southern Railroad between Santa Ana and Los Angeles were washed away on the 23d. At Los Angeles the heavy rains from the 22d to 26th caused considerable damage; streets were badly washed and the railroad bridges were generally destroyed. The Los Angeles River changed its channel south of the city, flooding the surrounding country. At Red Bluff, Cal., the high water, resulting from continuous rains previous to the 14th, was very destructive to bridges, etc. Reports state that in Tehama county the damage to public property will amount to \$40,000, while individual losses will aggregate \$250,000, and that adjoining counties to the southward suffered even greater injury from high water. The Rio Virgin River rose so high in the southern part of Lincoln Co., Nev., under the unprecedented rainfall, that it overflowed its banks in many places and changed its course, washing away everything in its path. Lake Tahoe is reported as having risen twelve inches. On the 5th the Salt and Verde rivers, in Arizona, rose very rapidly, and at Fort McDowell the Verde River overflowed its banks, flooding the adjacent lowlands. On the 6th, at Fort Verde, Ariz., the Verde River was higher than it has been during the last fifteen years, and considerable damage was caused along the river by the inundation of alfalfa fields, washing out of dams, etc.

#### STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the several

stations; the highest and lowest water during December, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, December, 1889 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, La. ....	29.9	8, 9, 10, 11	18.2	31	11.5	6.7
<i>Arkansas River:</i>						
Fort Smith, Ark. ...	22.0	1	8.4	31	2.0	6.4
Little Rock, Ark. ...	23.0	1	14.3	31	4.2	10.1
<i>Missouri River:</i>						
Fort Buford, Dak.*	.....	.....	.....	.....	.....	.....
Kansas City, Mo. ...	21.0	1	4.3	9, 15, 27, 28	3.2	1.1
<i>Mississippi River:</i>						
Saint Paul, Minn.*	14.5	.....	.....	.....	.....	.....
La Crosse, Wis.*	24.0	.....	.....	.....	.....	.....
Dubuque, Iowa ....	16.0	13	2.2	4, 5, 6	0.9	1.3
Davenport, Iowa ...	15.0	13	1.1	1, 2	0.2	1.1
Keokuk, Iowa ....	14.0	16, 17	0.4	5	0.7	1.1
Saint Louis, Mo. ...	32.0	15	6.2	9	3.8	2.4
Cairo, Ill. ....	40.0	2	29.5	14	17.3	12.2
Memphis, Tenn. ....	34.0	4	23.1	16	12.8	10.3
Vicksburg, Miss. ...	41.0	9	28.7	22, 23	19.0	9.7
New Orleans, La. ...	13.0	14	9.2	31	6.0	3.2
<i>Ohio River:</i>						
Pittsburgh, Pa. ....	22.0	15	15.1	8	5.9	9.2
Parkersburg, W. Va. .	38.0	14	20.0	6	8.5	11.5
Cincinnati, Ohio ...	50.0	1	29.9	10	16.6	13.3
Louisville, Ky. ....	25.0	1	11.9	11	8.2	3.7
<i>Cumberland River:</i>						
Nashville, Tenn. ...	40.0	1	19.2	20, 21	5.5	13.7
<i>Tennessee River:</i>						
Chattanooga, Tenn. .	33.0	1	7.7	22, 23	3.5	4.2
Knoxville, Tenn. ...	.....	1	3.7	15-21	1.0	2.7
<i>Monongahela River:</i>						
Pittsburgh, Pa. ....	29.0	15	15.1	8	5.9	9.2
<i>Savannah River:</i>						
Augusta, Ga. ....	32.0	1	8.2	29, 30	6.9	1.3
<i>Willamette River:</i>						
Portland, Oregon ..	15.0	12	4.1	18	0.2	3.9

\* Frozen.

#### LOW TIDE.

At New London, Conn., the lowest tide noted for many years occurred on the 23d.

### ATMOSPHERIC ELECTRICITY.

#### AURORAS.

Fort Buford, N. Dak.: a faint auroral display of a light yellow tint was observed in about azimuth 40° and altitude 8° at 11.12 p. m., 13th, and continued without any marked change until 1.40 a. m., 14th. Another aurora was observed at 10.48 p. m., 26th. It consisted of an irregular arch resting on a well-defined dark base, which extended over about 75° of azimuth from northwest to northeast, and rose to about altitude 25°. The color was white through the centre of the arch, and the outer edges were of a yellow tint. Up to 1.15 a. m. of the 27th the aurora remained unchanged, and a few traces were still visible at 7.15 a. m.

Hartford, Conn.: an auroral display was first observed at 8.55 p. m., 15th; stripes of light, interspersed with clear sky, covered 40° of the horizon, and rose half way up to the zenith.

Leaf River, Ill., 26th: very high tension on telegraph lines, and long circuits working strong and clear were followed at night by a bright auroral arch, which was visible as late as 12.30 a. m., 27th.

Fort Maginnis, Mont.: an aurora was observed in the north-east from 1.36 a. m. until 3 a. m. 27th. It consisted of luminous beams, which rose to altitude 45° and extended from about azimuth 180° to 270°. The color of the display was of a pale yellow and red.

Auroras were observed during the month as follows: 3d, Setauket, N. Y. 4th, Seven Pines, W. Va. 12th, Cresco, Iowa. 13th, Carson, Iowa. 14th, Fort Buford, N. Dak.; Webster, S. Dak. 15th, Hartford, Conn.; Dana, Ind.; Wah-

peton, N. Dak. 16th, Orono, Me. 18th, Greenwood, Wis. 21st, Orono, Me.; Fort Assinniboine, Mont.; Leech Farm, N. Dak. 22d, Fort Assinniboine, Mont.; Webster, S. Dak. 24th, Liberty, Va.; Tannery, W. Va. 26th, Winnebago, Ill.; Cresco and Maquoketa, Iowa; Fort Buford and Wahpeton, N. Dak.; Grantsburgh and Madison, Wis. 27th, Leaf River, Ill.; Berrien Springs, Mich.; Fort Maginnis, Mont.; Nashua, N. H.; Lyons, N. Y. 29th, Delavan, Wis.

#### THUNDER-STORMS.

Thunder-storms were reported in the greatest number of states and territories, fourteen, on the 21st; in twelve, on the 10th; in from six to ten, inclusive, on the 20th, 22d, 24th, 25th, 26th, 28th and 29th; and in from one to four, inclusive, on the 3d to 9th, 11th, 13th to 19th, 23d, 30th, and 31st. The 1st, 2d, 12th, and 27th were the only dates on which no thunder-storms were reported.

Thunder-storms were reported on the greatest number of dates, sixteen, in Michigan; on twelve in Illinois and Indiana; on ten in California; on nine in Ohio; on seven in Kansas and Missouri; and on from one to six, inclusive, in Alabama, Arizona, Arkansas, Indian Territory, Iowa, Kentucky, Louisiana, Massachusetts, Minnesota, Mississippi, Nebraska, New Jersey, New York, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, West Virginia, and Wisconsin. In states and territories other than those named no thunder-storms were reported.

Leaf River, Ill.: high electrical tension with severe electrical shocks, but absence of thunder and lightning, were noted at 3.50 p. m., 21st.

## MISCELLANEOUS PHENOMENA.

## DROUGHT.

The following reports of damaging drought have been made by regular and voluntary observers of the Signal Service:

Savannah, Ga., 31st: the weather during the month has been unusually dry, and it is the first month since the establishment of the Signal Service station in this city, in 1871, that the rainfall has amounted to less than 0.01 inch. The total precipitation for the month, 0.10, has been obtained from dew and fog. Augusta, Ga.: the drought which has prevailed in this section since November 27th was broken by rain on the afternoon of December 30th. The high temperature combined with the long prevailing dry weather makes the month the most remarkable December on record.

Raleigh, N. C., 31st: the month of December has been unusually warm and dry.

Jupiter, Fla., 31st: the dry weather during the month has been disastrous in this part of the state. Growers report that about one-half of the early vegetables have been injured by the drought. Matanzas, Fla., 31st: a severe drought prevails in this section.

Meridian, Miss.: the drought which has prevailed since the 27th of November was ended by the rain which fell during the afternoon of the 29th.

Emilie (near Mount Airy), La., 31st: the drought, though somewhat broken by the light rain in November, still continues, and its effect is very much felt. The swamps have never been so dry as they are at the present time.

Oskaloosa, Iowa, 31st: owing to insufficient rainfall the wells are very low and the creeks are nearly all dry.

## FOREST FIRES.

Chattanooga, Tenn.: a dense smoke prevailed from 10 a. m. to 5.40 p. m., 13th, caused by forest fires in the mountains.

Emilie, La., 31st: the fires which began in the woodlands toward the end of November are still burning in some places and have caused considerable damage to timber.

## PRAIRIE FIRES.

Fort Sill, Ind. T.: 1st, 12th, 15th to 19th, 21st, 25th, 26th, 28th to 31st. Fort Reno, Ind T.: 11th, 12th, 16th, 28th.

## HALOS.

Solar halos were most frequently reported in Michigan, where they were noted on eleven days; in Illinois and Ohio on nine days; on from six to eight days, inclusive, in California, Kansas, New York, North Carolina, Virginia, and Wisconsin, and on from one to five days, inclusive, in Arkansas, Connecticut, Georgia, Idaho, Indiana, Iowa, Maine, Maryland, Massachusetts, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, North Dakota, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont, and Washington. In states and territories other than those named no solar halos were reported. They were reported in the greatest number of states and territories, twelve, on the 16th; in from six to nine, inclusive, on the 1st, 5th, 9th, 10th, 15th, 25th, 27th to 31st, and in from one to five, inclusive, on the 2d, 3d, 4th, 6th, 7th, 8th, 11th to 14th, 17th to 21st, 23d, 24th, 26th. No solar halos were reported on the 22d.

Lunar halos were most frequently reported in Michigan, where they were noted on eighteen dates; in Illinois on sixteen dates; on from eleven to fifteen dates, inclusive, in Kansas, Louisiana, Missouri, New York, Ohio, Pennsylvania, South Dakota, and Texas, and on from one to ten dates, inclusive, in Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Idaho, Indiana, Indian Territory, Iowa, Kentucky, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, North Dakota, Oregon, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, Wisconsin, and Wyoming. Rhode Island and West Virginia were the only

states in which no lunar halos were reported. They were reported in the greatest number of states and territories, twenty-three, on the 29th; in twenty-one on the 28th; in from fifteen to twenty, inclusive, on the 1st to 4th, 9th, 27th, 30th, 31st; in twelve on the 5th and 6th; in eleven on the 7th and 8th, and in from one to ten, inclusive, on the 10th to 19th, 21st to 26th. No lunar halos were reported on the 20th.

## METEORS.

The distribution of meteors, by dates, was as follows: 1st, State College, Ohio; Phillipsburgh, Pa. 3d, Eagle's Mere, Pa. 5th, Point Isabel, Ind. 6th, Barren Creek Springs, Md.; Rimersburgh, Pa. 7th, Woodbury, N. J. 10th, Topeka, Kans. 11th, Villa City, Fla.; Topeka, Kans.; Hilton, Lacon, and Pekin, Ill.; Vevay, Ind.; Cedar Rapids, Iowa; Cumberland, Md.; Albion, Mich.; Oregon, Mo.; Beverly and Egg Harbor City, N. J.; Riddleton, Tenn. 12th, Lead Hill, Ark.; Golconda, Ill.; Manson, Iowa; La Harpe, Kans.; Beverly and Egg Harbor City, N. J.; Washington, N. C.; Dyberry, Phillipsburgh, and State College, Pa.; Fort Sully, S. Dak.; Dale Enterprise, Va. 13th, Beverly, N. J.; Spearfish, S. Dak.; Dale Enterprise, Va. 14th, Dale Enterprise, Va. 15th, Beverly, N. J.; Washington, N. C.; Yellow Springs, Ohio. 18th, Villa City, Fla.; Albion, Mich. 19th, Canton and Hartford, Conn.; Mount St. Mary's, Md.; Nineveh and Wedgwood, N. Y.; Raleigh, N. C.; Blue Knob and Eagle's Mere, Pa. 20th, Villa City, Fla.; La Harpe, Kans.; Nottaway C. H., Va. 21st, La Harpe and Wichita, Kans.; Honey Mead Brook, N. Y.; Quakertown, Pa.; Fort Sully, S. Dak.; Grantsburgh, Wis. 22d, Rushville, Ill.; Spartanburgh, S. C. 23d, Kootenai, Idaho; Spartanburgh, S. C.; Wauseon, Ohio. 24th, Hilton, Ill.; Spearfish, S. Dak. 25th, Villa City, Fla.; Westerville, Ohio. 26th, Randolph, Mass.; Spearfish, S. Dak. 27th, Villa City, Fla.; Washington, N. C. 28th, Charlesville, Pa. 29th, El Paso, Tex. 30th, Kansas City, Kans.

## SUN SPOTS.

Haverford College Observatory, Pa. (observed by Prof. F. P. Leavenworth):

Date.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculae.	Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.		
Dec., 1889.										
1, 12 m. ....	0	0	0	0	0	0	0	0	7	Definition good.
2, 10 a. m. ....	0	0	0	0	0	0	0	0	0	Definition poor.
4, 11 a. m. ....	0	0	0	0	0	0	0	0	0	Definition poor.
12, 3 p. m. ....	1	1	0	0	0	0	1	1	1	Definition good.
13, 11 a. m. ....	0	0	1	1	0	0	0	0	...	Definition good.
19, 9 a. m. ....	0	0	0	0	0	0	0	0	1	Definition poor.
19, 9 a. m. ....	2	9	0	0	0	0	2	9	1	Definition poor, spots small.
21, 10 a. m. ....	1	26	0	0	0	0	3	37	4	Definition good, spots small.
23, 12 m. ....	0	0	0	0	0	0	1	1	4	Definition good.
24, 12 m. ....	0	5	0	0	0	0	1	6	1	Definition fair.
25, 11 a. m. ....	0	14	0	0	0	0	1	20	0	Definition fair, 1 large spot.
26, 11 a. m. ....	0	0	0	0	1	1	1	13	0	Definition poor.
27, 11 a. m. ....	1	10	0	0	0	0	2	23	...	Definition good, 2 large spots.
28, 11 a. m. ....	0	0	0	0	0	0	2	21	...	Definition good, 1 spot has white mark in umbra.
31, 11 a. m. ....	0	0	0	0	0	0	1	1	...	Definition poor, 1 spot has white mark in umbra.

Mr. C. E. Buzzell, Leaf River, Ill.: Solar observations were made only on the following days in December, 1889: 1st, 6th, 8th, 9th, 11th, 12th, 14th, 15th, 18th, 19th, 20th, 22d, 25th, 26th, 27th, 30th, and 31st. No spots were observed until the 18th, small group; near meridian in view on the 20th. 22d, prominent faculae on both limbs. No spots on the 23d. One small spot, five days, which on the 25th increased to a group of fifteen spots, still in view on the 27th. On the 27th a large spot observed near the east limb, which was central on January 2d, 1890. All of the above were new disturbances.



Mr. John W. James, Riley, Ill.: no sun spots were seen till the 25th, then a group about 43,000 miles long, a little west of the sun's meridian, disappearing by solar rotation on the eve of the 30th. A single spot about 16,000 miles diameter found three days east of the sun's meridian on the 30th.

Mr. M. A. Veeder, Lyons, N. Y.: on December 12th a spot of considerable size was at the western limb, and some faculae were near the eastern limb. 20th, a train of spots had formed nearly in the location of the faculae that appeared by rotation on December 12th. These spots faded out and the faculae in their location disappeared by rotation on the 24th. On the 20th a spot of considerable size was seen near the eastern limb; this spot had nearly faded out on December 22d, but on the 23d it increased again and was seen on the 25th, 26th, and 27th, followed by a train of smaller spots, which faded out before reaching the western limb. 26th, a large spot appeared by rotation and was seen on the 27th, 29th, and 31st. Observation was poor on many days in this month.

Mr. H. D. Govey, North Lewisburgh, Ohio: sun spots 12th, 19th, 20th, 21st, 25th to 28th, 30th, and 31st.

## MIRAGE.

Mirage were observed as follows: 1st, 4th, and 5th, Marquette, Nebr. 6th, Hampton, Iowa, and New England City, N. Dak. 11th, Bancroft, Iowa. 12th, Marquette, Nebr. 13th, Hampton, Iowa. 14th, Marquette, Nebr.; Woonsocket and Webster, S. Dak. 15th, Woonsocket and Webster, S. Dak. 16th and 17th, Hampton, Iowa, and Woonsocket, S. Dak. 22d, Webster, S. Dak. 26th, Marquette, Nebr.; Woonsocket and Webster, S. Dak. 27th, Marquette, Nebr., and Wolsey, S. Dak.

Spearfish, S. Dak.: a fine mirage was observed on the morning of the 8th. The high lands along the Belle Fourche were lifted into plain view, and, though twenty miles away, seemed but a mile or two distant. It lasted for more than an hour, beginning with the first rays of the morning sun.

Huron, S. Dak.: a singular, fine mirage was observed soon after daylight on the 22d, and lasted for about one hour. A range of hills covered with snow was seen at a distance of four miles east of this place. The projecting white mountain peaks, with intervening white spaces, composed of lakes, covered with ice, were plainly seen.

## VERIFICATIONS.

## FORECASTS FOR 24 HOURS IN ADVANCE.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Division.]

The forecasts for districts east of the Rocky Mountains for December, 1889, were made by Captain James Allen, 3d Cavalry, Signal Officer, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, December, 1889.

States.		States.	
Maine.....	79.2	Kentucky.....	87.0
New Hampshire.....	83.6	Ohio.....	84.1
Vermont.....	81.7	West Virginia.....	80.9
Massachusetts.....	82.9	Indiana.....	84.3
Rhode Island.....	85.3	Illinois.....	83.6
Connecticut.....	84.3	Lower Michigan.....	82.9
Eastern New York.....	85.2	Upper Michigan.....	77.4
Western New York.....	77.7	Wisconsin.....	83.5
Eastern Pennsylvania.....	84.1	Minnesota.....	80.1
Western Pennsylvania.....	80.5	Iowa.....	83.4
New Jersey.....	88.2	Kansas.....	82.3
Delaware.....	87.7	Nebraska.....	78.2
Maryland.....	86.5	Missouri.....	83.5
District of Columbia.....	85.0	Colorado.....	79.7
Virginia.....	84.5	North Dakota.....	83.7
North Carolina.....	87.4	South Dakota.....	80.8
South Carolina.....	86.8	Southern California*.....	85.9
Georgia.....	88.7	Northern California*.....	90.6
Eastern Florida.....	93.6	Oregon*.....	81.8
Western Florida.....	95.4	Washington*.....	80.7
Alabama.....	91.1	By elements: Weather.....	85.8
Mississippi.....	92.3	Temperature†.....	83.0
Louisiana.....	91.2	Monthly percentage of weather and	
Texas.....	89.0	temperature combined.....	84.7
Arkansas.....	85.1		
Tennessee.....	85.2		

\* In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. † The forecasts of temperature in districts east of the Rocky Mountains for December, 1889, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day. ‡ The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

## FORECASTS FOR 48 AND 72 HOURS IN ADVANCE.

Appreciating the great importance that long time predictions possess for the general public the Chief Signal Officer has authorized forecasts for forty-eight and seventy-two hours, covering the second and third days in advance. Such forecasts are optional with the predicting officer, and are only

made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications of forecasts made for second day in advance. Number of predictions made: weather, 158; temperature, 92. Percentages of verifications: weather, 74.5; temperature, 84.9. Weather and temperature combined, 78.7.

Percentages of verifications of forecasts made for third day in advance. Number of predictions made: weather, 34; temperature, 7. Percentages of verifications: weather, 79.4; temperature, 78.6; weather and temperature combined, 79.0.

## CAUTIONARY SIGNALS FOR DECEMBER, 1889.

Statement showing percentages of justifications of wind signals for the month of December, 1889:

**Wind signals.**—(Ordered by Captain James Allen.) Total number of signals ordered, seventy-one; justified as to velocity, wholly, fifty, partly, five; justified as to direction, sixty-two. Of the signals ordered, forty-nine were cautionary, of which thirty-five were wholly, and one partly, justified; and twenty-two were storm signals, of which fifteen were wholly, and four partly, justified. Thirty signals were ordered for easterly winds, of which twenty-two were justified, and forty-one were ordered for westerly winds, of which forty were justified. Percentage of justifications, 68.6.

**Cold-wave signals.**—(Ordered by Assistant Professor T. Russell.) Total number of signals ordered, two hundred and twenty-one; justified, one hundred and eighteen. Percentage of justifications, 53.4.

Percentages of local verifications of weather and temperature signals reported by directors of the various State Weather Services for December, 1889.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois.....	72.1	80.4	New Jersey.....	80.1	92.3
Indiana.....	82.0	83.0	New York.....	82.6	86.3
Kansas.....	82.2	83.9	Ohio.....	88.0	82.0
Michigan.....	86.9	86.7	Pennsylvania.....	80.0	87.0
Minnesota.....	71.0	77.0	South Carolina.....	91.0	92.0
Missouri.....	76.0	79.0	Tennessee.....	82.7	78.9
Nebraska.....	82.7	88.1			

## STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for December, 1889, of the directors of the various state weather services:

## ALABAMA.

The month was mild and spring-like. All stations report it the warmest December on record; the temperature was 12.1 above the normal. The precipitation was 3.48 below the normal.

*Temperature.*—Highest monthly mean, 61, at Mobile; lowest monthly mean, 53.7, at Valley Head; maximum, 82, at Wiggins and Citronelle, on 15th and 16th; minimum, 20, at Valley Head, on the 1st; range for state, 63; greatest local monthly range, 56, at Valley Head; least monthly range, 39, at Elkmont.

*Precipitation.*—Greatest, 4.05, at Livingston; least, 0.06, at Bermuda.

*Wind.*—Prevailing direction, southwest.—*P. H. Mell, Signal Corps, Auburn, director.*

## ARKANSAS.

*Temperature.*—Highest monthly mean, 68.0; lowest monthly mean, 52.6; maximum, 83, at Osceola, 13th; minimum, 19, at Heber, 31st, and at Winslow, on the 29th; range for state, 64; greatest local monthly range, 58, at Devall's Bluff; least local monthly range, 26, at Malvern.

*Precipitation.*—Greatest, 1.76, at Malvern; least, 0.00, at Devall's Bluff, Pine Bluff, and Texarkana.—*M. F. Locke, Commissioner of Agriculture, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.*

## COLORADO.

*Temperature.*—The mean for the state was over 8 above the average for the past three years. The temperature was almost 6 higher than that of November. The greatest monthly mean was 44.4, at Cañon City, and the least, 20.4, at Climax. The highest temperature for the state was 86, at Breckenridge, and the lowest —24, at Gunnison. The highest local monthly range of temperature was 103, at Breckenridge; the lowest was 40, at Rifle Falls. The absolute range for the state reached 110.

*Precipitation.*—The average of the last three years is only 0.44, the excess, therefore, is very marked, being over 100 per cent. At Fort Lewis the remarkably heavy precipitation for the month, of 7.58, is reported; and no precipitation, or a trace merely, fell at a number of stations.—*Prof. F. H. Loud, Colorado Springs, director; W. S. Miller, Corporal, Signal Corps, assistant.*

## ILLINOIS.

*Temperature.*—Maximum, 76, at Mascoutah, 10th; minimum, 5, at Hennepin, 1st; mean of maximum, 66.6; mean of minimum, 15.2; monthly mean of maximum and minimum, 44.9.

*Wind.*—Prevailing direction, southwest.—*John Craig, Sergeant, Signal Corps, Springfield, in charge.*

## INDIANA.

December, 1889, was exceedingly warm throughout; in fact the mean temperature for the month is the highest ever recorded.

*Temperature.*—Highest monthly mean, 51.5, at Scalesville; lowest monthly mean, 40.7, at Delphi and Columbia City; maximum, 74, at Scalesville, 16th; minimum 12, at Mauzy, 1st; range for state, 62; greatest local monthly range, 57, at Rockville; least local monthly range, 37, at Shelbyville.

*Precipitation.*—The rainfall was nearly everywhere below the normal for December; the greatest deficiency occurred in the central portion, 0.43, while that in the northern and eastern portions was about 0.27. Greatest, 4.90, at Marengo; least, 1.77, at Farmland.

*Wind.*—Prevailing directions, southeast and southwest.—*Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Sergeant, Signal Corps, assistant.*

## IOWA WEATHER CROP BULLETIN SERVICE.

*Temperature.*—Highest monthly mean, 42.6, at Keokuk; lowest monthly mean, 31.3, at Cresco; maximum, 76, at Glenwood, 28th; minimum, 1, on the 30th, at Larrabee; average maximum, 63.7; average minimum, 6.6; greatest local monthly range, 72, at Glenwood; least local monthly range, 46, at Iowa City; monthly range for the state, 75; average monthly range, 57.

*Precipitation.*—Greatest reported, 3.20, at Elkader; least, 0.14, at Logan.

*Wind.*—Prevailing direction, south.—*G. M. Chappel, Sergeant, Signal Corps, Des Moines, in charge, Iowa Weather Crop Bulletin Service.*

## IOWA.

December, 1889, was extremely warm; southerly winds prevailed, and rainfall was very light.

*Temperature.*—The mean temperature was almost 16 above normal. During the 50 years for which we have record, the temperature of December has but once been as high, namely in 1877, when it was about 17 above normal. We may, therefore, say that so warm a December can be expected in Iowa only about four times in a century. The entire month was almost uniformly warm. Every day of the month was above normal, except the 30th, which was only 2 below normal. Again, except the 26th, 29th, 30th, and 31st, all days were more than 10 above normal.

*Precipitation.*—The total rainfall exceeded 1.00 throughout northeastern Iowa, while over 2.00 fell in the northeastern part of the state in parts of Allamakee, Fayette, and Clayton counties. In most of central and southern Iowa less than 0.50 fell.—*Dr. Gustavus Hinrichs, Iowa City, director.*

## KANSAS.

The month has been the warmest and driest on record for the state.

*Temperature.*—The monthly mean temperature is 15 above the normal; highest monthly mean, 53.2, at Lakin; lowest monthly mean, 30.1, at Allison; maximum, 80, at Richfield, 12th; minimum, 0, at Manhattan and Vesper, 30th; range for state, 80; greatest local monthly range, 75, at Manhattan; least local monthly range, 48, at Morse; greatest daily range, 43.2, at Lebo, 27th; least daily range, 2, at Independence, 14th.

*Precipitation.*—Most of the precipitation fell in the eastern division, and the average deficiency for the state is 1.24; greatest, 0.82, at Marmaton; least, 0.00, at the greater number of stations.

*Wind.*—Prevailing direction, south.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.*

## KENTUCKY.

*Temperature.*—There was an excess of about 13 above the normal for December and about 6 more than the average for November. The excess far surpasses that of any previous December for which accurate records are accessible. The record of the central station extends backward for twenty years, and the mildest December in that period was in 1875, when the mean for the month was 45. The highest temperature recorded during the month was 73, at Springfield, 19th, and the lowest, 13, at Ashland, 1st.

*Precipitation.*—The average precipitation is about 3.00 less than the normal for the month. At the central station the year closed with a deficiency of 14.87, or about 30 per cent. of the normal for the year. The greatest rainfall reported was 2.36 at Frankfort, and the least, 0.11, at South Fork. No snowfall is reported for the month.

*Wind.*—Prevailing direction, south.—*Dr. E. A. Grant, Louisville, director, Frank Burke, Sergeant, Signal Corps, assistant.*

## LOUISIANA.

The past month was the warmest and driest December on record.

*Temperature.*—Highest monthly mean, 66.2, at New Iberia; lowest monthly mean, 58.7, at Farmerville; maximum, 90, at New Iberia, 11th; minimum, 23, at Plaquemine, 1st; range for the state, 67; greatest local monthly range, 58, at Plaquemine and Luling; least, 34, at Shell Beach; mean daily range, 22.1.

*Precipitation.*—Greatest local monthly rainfall, 3.75, at Grand Coteau; least local monthly rainfall, 0.20, at Point Eads.

*Wind.*—Prevailing direction, south.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

## MICHIGAN.

*Temperature.*—The mean temperature is 7.9 above the normal of fifteen years, and is the next highest monthly temperature reported in that period, the highest being 37.2 in 1877; highest monthly mean, 42.9, at Benton Harbor; lowest monthly mean, 24.8, at Atlantic; maximum, 65, at several stations on 24th to 29th; minimum, —8, at Lathrop, 31st; range for state, 73; greatest local monthly range, 58, at Ionia and Hillman; least local monthly range, 35, at Columbiaville; greatest daily range, 52, at Ionia, 4th; least daily range, 1, at Manistee, 17th.

*Precipitation.*—The average for the state is 0.15 above the normal; it was above the normal in all sections, from 0.04, in the southern section, to 0.99 in the upper peninsula; greatest, 4.72, at West Branch; least, 0.91, at Charlevoix.

*Wind.*—Prevailing direction, southwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

## MINNESOTA.

*Temperature.*—Highest monthly mean, 33.8, at La Crosse, Wis.; lowest monthly mean, 10.6, at Saint Vincent; maximum, 61, at La Crosse, Wis., 24th; minimum, —29, at Pokegama Falls, 30th; range for state, 90; greatest local monthly range, 73, at Pokegama Falls; least local monthly range, 46, at Farmington; greatest daily range, 45, at Saint Vincent, 14th; least daily range, 2, at Saint Paul, 3d, and at La Crosse, Wis., 17th.

*Precipitation.*—Greatest, 3.60, at Saint Charles; least, 0.22, at Crookston.

*Wind.*—Prevailing direction, south.—*John Healy, Private, Signal Corps, Saint Paul, in charge.*

## MISSISSIPPI.

*Temperature.*—The mean temperature is 13.2 above the normal. Highest monthly mean, 63, at Vicksburg; lowest, 24.4, at Corinth; the greatest local monthly range was 60, at Louisville, and the least, 39, at Pearlinton.

*Precipitation.*—The average precipitation is 42.8 below the normal for December. This deficiency added to that at the beginning of the month makes the total deficiency for the year 17.79.

*Wind.*—Prevailing direction, south.—*R. B. Fulton, Signal Corps, University, director.*

## METEOROLOGICAL REPORT OF THE MISSOURI STATE BOARD OF AGRICULTURE.

The temperature was about 16 above the normal over the entire state. The rainfall was about 1.50 below the normal, the only exceptions to this deficiency being Oak Ridge and Ironton, where the amount was above the normal.

*Temperature.*—Highest monthly mean, 55.3, at Protem; lowest monthly mean, 41.1, at Harris; maximum, 80, on the 13th, at Protem; minimum, 2, on the 30th, at Craig; range for the state, 78; greatest local monthly range, 73, at Craig; least local monthly range, 47, at Oak Ridge.

*Precipitation.*—Greatest, 4.60, at Oak Ridge; least, 0.00, at Conception, and trace at Kidder. No snow fell except at Wither's Mill, where 3.00 fell.—*Levi Chubbuck, Secretary of State Board of Agriculture, Columbia, director; A. L. McRae, Sergeant, Signal Corps, assistant.*

## NEBRASKA.

December has been a remarkable month as regards its very high temperature and the very small amount of precipitation.

*Temperature.*—The highest December mean heretofore recorded was 33.2, in 1881; rarely has it been so high as 30, and the normal for December is only 24.5. Indeed, the mean temperature of December this year has been 4 above that of November. The month has also been remarkable for the ex-



tre range of its temperature. A maximum of 80 is reported at Weston, and the minimum reached -14 at Fort Niobrara.

**Precipitation.**—No December heretofore has given us so little precipitation. Very rarely is there less than 0.50, and the normal for December is 0.75 for southeastern Nebraska. The precipitation over the state for the past month has ranged from a little over an inch at two widely remote stations in the northeast and southwest to a mere trace or none at all over the southeastern counties.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Sergeant, Signal Corps, assistant.*

#### NEVADA.

**Temperature.**—The mean temperature for the month was slightly below the normal, which, however, is due to the warm days during the first of the month, as the latter part of the month was severe in most localities. During this period the temperature was very low for the month of December, having been recorded as -20 at Elko, -19 at Beowawe, and -14 at Ely, these being the lowest reported. The maximum temperature was reported from El Dorado Canyon, 69.9, 2d, the extreme range for the state being 89.9. The lowest mean temperature reported was 25.2, at Tuscarora, and the highest, 55.7, at El Dorado Canyon.

**Precipitation.**—December, 1889, will go upon record as an exceptional month as regards precipitation. The greatest amount of precipitation reported was 11.12 at Pioche. Following this came Leonard's Creek with 9.43; Tuscarora, 9.28; Lewers' Ranch, 5.44, and Genoa, 7.55. The greatest amount of snow which fell at one station was at Tuscarora, 81.50, for the month, with 42.00 on the ground December 31.

**Wind.**—Prevailing direction, south.—*Prof. Chas. W. Friend, Carson City, director; H. E. Wilkinson, Corporal, Signal Corps, assistant.*

#### NEW ENGLAND METEOROLOGICAL SOCIETY.

December will be remembered as the warmest month of that name during the past quarter of a century. The mean temperature was 6.4 above the normal for the season, and this was attained by an equable temperature throughout the month and not by large individual departures.

**Temperature.**—Highest monthly mean, 41.4, at Block Island; lowest monthly mean, 22.7, at Berlin Falls; maximum, 71, at Olneyville, 25th; minimum, -22, at West Milan, 4th; range for New England, 93; greatest local monthly range, 72, at West Milan; least local monthly range, 30, at Nantucket; greatest daily range, 50, at West Milan, 1st; least daily range, 0, at Concord, 3d; Lunenburg, 9th and 21st; Princeton, 18th. The average temperature for December for 25 stations, having records for more than ten years, is 27.5; the average for December, 1889, is 33.8, departure, +6.3.

**Precipitation.**—Greatest, 5.92, at Bar Harbor; least, 0.95, at Block Island. The average precipitation for December for 34 stations, having records for more than ten years, is 3.55; the average for December, 1889, is 3.04; departure, -0.51.

**Wind.**—Prevailing direction, northwest.—*Prof. William H. Niles, Boston Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; L. G. Schultz, Sergeant, Signal Corps, assistant.*

#### NEW JERSEY.

**Temperature.**—The mean temperature is 9.0 above the average for the month, and 6.6 above the average for the corresponding month of 1888; highest monthly mean, 46.6, at Cape May C. H.; lowest monthly mean, 37.8, at Hanover; maximum, 71, at Beverly, 25th; minimum, 8, at Hanover and Plainfield, 4th and 5th, respectively; range for the state, 63; greatest local monthly range, 60, at Plainfield; least local monthly range, 38, at Ocean City; greatest daily range, 45, at Gillette, 4th; least daily range, 1, at Trenton and Asbury Park, 14th and 18th, respectively.

**Precipitation.**—The average precipitation is 2.00 below the average, and 2.07 below the average for the corresponding month of 1888.

**Wind.**—Prevailing direction, southwest.—*E. W. McGann, Sergeant, Signal Corps, New Brunswick, in charge.*

#### NEW YORK.

**Temperature.**—The highest temperature reported was 70, at Erie, Pa., 29th; the lowest, 6.5, at Canton, 4th. The 25th was the warmest, and the 4th the coldest day. The greatest local monthly range of temperature was 62, at Auburn and Middleburgh, and the least range, 45, at Buffalo and Spencerport. The temperature was everywhere greatly above the normal.

**Precipitation.**—The rainfall was generally above the average, excepting along Lake Ontario, and also in the Hudson Valley, where the only station reporting an excess is Rondout. The greatest monthly rainfall was 6.14, at Constableville; the least, 1.37, at Malone. The average number of days on which the precipitation was .01 or more of rain or melted snow was 13.3. The greatest monthly snowfall was 10.00, at Constableville and Queensbury.

**Wind.**—Prevailing direction, southwest.—*Prof. E. A. Fuetes, Ithaca, director; I. W. Brewer, Private, Signal Corps, assistant.*

#### NORTH CAROLINA.

December, 1889, was a remarkably mild and dry month. The departure from the normal temperature was greatest in the central and western portions of the state, where at every station the mean for December was higher than that for the preceding November. The rainfall was the least since 1871.

**Temperature.**—The monthly mean is 10.3 above the normal for December; highest 78, 24th, at Newbern; lowest 12, 1st, at Franklin; range for the state, 66; highest monthly mean, 59.3, at Southern Pines; lowest monthly mean, 47.6, at Franklin; greatest local monthly range, 60, at Franklin; least local monthly range, 31, at Hatteras; mean maximum, 63; mean minimum, 43.

**Precipitation.**—The average for the state is 4.26 below the normal; greatest monthly, 1.68, at Marion, Va.; least monthly, 0.10, at Southport. The only station in the state having a total of 1.00 was Southern Pines.

**Wind.**—Prevailing direction, southwest; average direction from many years observations, southwest.—*Dr. Herbert B. Battle, Raleigh, director; C. F. von Herrmann, Sergeant, Signal Corps, assistant.*

#### NORTH AND SOUTH DAKOTA.

**Temperature.**—Highest monthly mean, 34.4, at Yankton, S. Dak.; lowest monthly mean, 10.6, at Saint Vincent, Minn.; maximum, 76, at Parkston, S. Dak., and Valentine, Nebr., 7th; minimum, -21, at Webster, S. Dak., and Saint Vincent, Minn., 30th; greatest local monthly range, 72, at Woonsocket, S. Dak.; least local monthly range, 42, at De Smet, S. Dak.; greatest daily range, 50, at Huron, S. Dak., 26th; least daily range, 1, at Fort Sully, S. Dak., 31st. The mean temperature for the state is about 8.7 above the normal.

**Precipitation.**—Greatest monthly, 2.53, at Webster, S. Dak.; least monthly, 0.03, at Gallatin, N. Dak. The average precipitation for the states is about 0.25 above the normal.

**Wind.**—Prevailing direction, southeast.—*S. W. Glenn, Sergeant, Signal Corps, Huron, in charge.*

#### OHIO.

**Temperature.**—This was the warmest December on record in the bureau. The mean temperature was 11.5 above the average for the past eight years, and 10.5 above the highest previous record, 33.3, in December, 1888. The means in the northern, middle, and southern sections were 10.4, 11.9, and 12.3, respectively, above the eight year average. The maximum temperature, 73, occurred at Hanging Rock, 10th, and is the highest maximum since 1886. The minimum temperature, 10, occurred at Wapakoneta, 1st, and is the highest minimum on record for December. The average daily range of temperature was 19.1; the greatest daily range was 38.9, at McConnellsville, 2d, and the smallest, 2, at Columbus, 18th.

**Precipitation.**—The mean rainfall in the northern section was 0.96 above the average; the mean for the state was also above the average, being 0.23 in excess of the usual rainfall for December; the means in the northern and southern sections were 0.02 and 0.26 below the average for December; the greatest monthly rainfall reported was 5.32, at Poland, and the smallest, 1.45, at Wapakoneta.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

#### OREGON.

**Temperature.**—The mean temperature is 2.9 below the average; highest monthly mean, 46.3, at Bandon; lowest monthly mean, 23.2, at Joseph. Along the coast the mean average was 41; in the interior valleys, 37, and in the eastern part of the state, 30; maximum temperature, 58, at Bandon; minimum, -10, at Silver Lake. The least ranges of temperature, 18 to 29, occurred along the coast, and the greatest, from 55 to 61, in Malheur county.

**Precipitation.**—The precipitation was below the normal in all parts of the state. West of the Cascades the deficiency averaged 2.00, and east of them 1.00. Along the coast from 8.00 to 17.00 fell; in the interior valleys from 3.00 to 8.00, and in eastern Oregon from 0.65 to 4.00, except at the Cascade locks, where 8.00 was recorded. The greatest amount, 17.25, fell at Ellensburg, and the least, 0.65, at Umatilla. Snow fell in all parts of the state, except along the coast, in depths ranging from 0.5, at Eugene, to 31.00 at Hood River.

**Wind.**—Prevailing direction, southeast.—*Hon. H. E. Hayes, Master State Grange, Oswego, director; B. S. Pague, Sergeant, Signal Corps, assistant.*

#### PENNSYLVANIA.

**Temperature.**—The mean temperature for December, 1889, is about 9 in excess of the normal, and as compared with Philadelphia temperatures for the past one hundred years and over, it was the warmest December on record. The greatest departures were in the western part of the state, where the mean temperature for the month averaged 11 above the normal. In the eastern portion it was about 7 above. There was a complete absence of the low temperatures that usually occur in December, and the maximum temperatures were decidedly higher. The highest temperatures reported were Centre Valley, 73; Lewiston, Erie, and Waynesburgh, 70; and Coatesville, 68. The lowest were Le Roy and Eagle's Mere, 0; Somerset, 6; Wysox, Grampian Hills, Wellsborough, Columbus, Dyberry, and Honesdale, each 8. The lowest temperature occurred on the 4th, and the highest during the 25th.

**Precipitation.**—The total precipitation is 0.20 less than the average. There was a slight excess in the western part of the state and a deficiency in the eastern. The greatest totals were Columbus, 5.05; Grampian Hills, 4.67; Johnstown, 4.62; Tipton, 4.49; and Somerset, 4.29. The least were Philadelphia, 0.85; Germantown, 0.91, and Swarthmore, 1.05. The only snow that occurred was in the northeastern part of the state, Dyberry reporting the greatest, 7 inches.

**Wind.**—Prevailing direction, west.—*Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant.*

#### SOUTH CAROLINA.

**Temperature.**—The mean temperature for the state is over 10 warmer than that for the same month in 1887 and 1888, and as shown by meagre meteorological records, it was the warmest December for twenty years. Highest monthly mean, 60.1, at Timmonsville; lowest monthly mean, 48.4, at Camden; maximum, 79.0, at Conway and Trial, 11th; minimum, 17.0, at Spartanburgh, 2d; greatest local monthly range, 61.0, at Spartanburgh; least local monthly range, 38.0, at Port Royal and Timmonsville.

**Precipitation.**—Greatest monthly, 1.07, at Aiken; least monthly, 0.00, at

Conway, Hardeeville, and Port Royal. Reports show that this is the least rainfall for December that has ever been recorded in this state.

Wind.—Prevailing direction, southwest.—Hon. A. P. Butler, Columbia, director; J. W. Cronk, Sergeant, Signal Corps, assistant.

#### TENNESSEE.

The meteorological features for December were, in some respects, rather phenomenal, the principal of which were the high temperature that prevailed during the month, except the first and last days, the abnormally small amount of rainfall and electrical disturbance, and absence of high winds.

Temperature.—The December mean was 14 above the average for seven years; the highest monthly mean was 60.4, at Bolivar, and the lowest, 48.4, at Rogersville; maximum, 78, at Bolivar, 15th, at Austin, 21st, and at McKenzie, 19th and 25th. Except in 1883, this was the highest December maximum during the past seven years. The minimum temperature was 17, recorded at Springdale on the 1st, and was the highest minimum during the past seven years, the lowest being -8, in 1886. The daily ranges of temperature were about normal.

Precipitation.—The average monthly rainfall for the state was much the smallest rainfall during the past seven years, being nearly 2.50 less than the average for that period. It was, perhaps, the smallest December rainfall during the past twenty years; greatest monthly rainfall, 3.22, at Lynnville; least, 0.44, at Chattanooga.

Wind.—Prevailing directions, south and southwest.—J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.

#### TEXAS.

Temperature.—The mean temperature for the month is from 8 to 15 above the 15-year normals. This is unusually warm for the month of December, and nothing to compare with it has occurred since 1875. Maximum, 86, at Gallinas, 10th; minimum, 12, at Panhandle, 30th.

Precipitation.—The rainfall for the month was unusually light, not reaching half an inch, except at Brenham, where it amounted to 0.72. The normal precipitation for December over the agricultural portion of the state east of the ninety-eighth meridian is about 2.00, and the fall for the month has been almost ten per cent. of that amount.—D. D. Bryan, Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.

Meteorological record of Army post surgeons, voluntary, and other co-operating observers, December, 1889.

\*Extremes of temperature from observed readings. †Signal Service instruments. ‡One observation daily at 10.00 a. m. Letters of the alphabet denote the number of days missing from the record, thus: the letter c indicates three days missing in a thirty-one day month, etc., etc. Corrections: In November miscellaneous table of voluntary observers, Quitman (2), Ga., for total precipitation, 0.25, read 1.35. Sycamore, Ill., total precipitation for June should be 1.96, instead of 1.50; and for February, 1.16 instead of 0.86.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<b>Alabama.</b>	0	0	0	Ins.	<b>Arkansas—Cont'd.</b>	0	0	0	Ins.
Bermuda †	78	35	57.0	0.06	Devall's Bluff †	74	20	53.1	0.00
Butler	77	28	59.2	1.35	El Dorado †	74	26	53.0	0.46
Citronelle	82	29	64.2	1.06	Forrest City †	80	28	61.6	0.40
Columbiana †	75	23	58.8	2.14	Fulton	76	22	59.4	0.00
Decatur (1) †	75	23	58.8	1.10	Harriaburgh	76	22	59.4	0.40
Decatur (2) †	75	23	58.8	1.10	Heber	76	22	59.4	0.40
Double Springs *	78	35	59.6	0.67	Hot Springs	76	22	59.4	0.40
Elkmount	75	23	58.8	1.10	Huntington	76	22	59.4	0.40
Evergreen †	75	23	58.8	1.10	Lead Hill	76	22	59.4	0.40
Fayette C. H. †	76	24	59.5	1.20	Little Rock B'ks	76	22	59.4	0.40
Gadsden †	77	24	59.9	1.07	Lonoke	76	22	59.4	0.40
Greenaborough †	77	24	59.9	1.07	Malvern †	76	22	59.4	0.40
Livingston †	77	24	59.9	1.07	Monticello †	76	22	59.4	0.40
Mt. Vernon B'ks	77	24	59.9	1.07	Newport (1) †	76	22	59.4	0.40
Pine Apple	77	24	59.9	1.07	Ozone †	76	22	59.4	0.40
Tusculum (1) †	74	24	59.6	1.02	Pine Bluff †	76	22	59.4	0.40
Uniontown	76	24	59.6	1.02	Stuttgart †	76	22	59.4	0.40
Valley Head †	76	24	59.6	1.02	Texarkana †	76	22	59.4	0.40
Wiggins	76	24	59.6	1.02	Washington †	76	22	59.4	0.40
<b>Alaska.</b>	40	5	28.4	5.40	Winslow †	79	30	60.7	0.19
Killisnoo	41	13	29.7	2.40	<b>California.</b>	70	19	53.0	0.47
<b>Arizona.</b>	10	23	16.23	10.23	<b>Alcatraz Island</b>	62	41	50.1	13.04
Ash Creek	33	52.2	1.13	1.13	American Hill †	71	26	44.2	21.22
Ash Springs	33	52.2	1.13	1.13	Anderson	65	27	43.8	18.24
Chiri Cahu Mts	33	52.2	1.13	1.13	Angel Island	65	27	43.8	18.24
Cooley's Springs †	33	52.2	1.13	1.13	Arcata	62	32	47.8	11.18
Dos Cabezas	33	52.2	1.13	1.13	Benicia Barracks	60	36	48.4	12.59
Dragon	33	52.2	1.13	1.13	Berkeley	60	36	48.4	12.59
Fort Apache	33	52.2	1.13	1.13	Campo	65	43	52.8	9.34
Fort Bowie	33	52.2	1.13	1.13	Centerville *	66	38	53.2	12.13
Fort Huachuca	33	52.2	1.13	1.13	Colegrove	66	38	53.2	12.13
Fort Lowell	33	52.2	1.13	1.13	Crescent City	66	38	53.2	12.13
Fort McDowell	33	52.2	1.13	1.13	Evergreen	66	38	53.2	12.13
Fort Mojave	33	52.2	1.13	1.13	Ferndale	66	38	53.2	12.13
Fort Verde	33	52.2	1.13	1.13	Fort Bidwell	66	38	53.2	12.13
Gila Bend	33	52.2	1.13	1.13	Fort Gaston	66	38	53.2	12.13
Lochiel *	33	52.2	1.13	1.13	Fort Mason	66	38	53.2	12.13
Prues Ranch	33	52.2	1.13	1.13	Georgetown †	66	38	53.2	12.13
San Carlos	33	52.2	1.13	1.13	Grass Valley	66	38	53.2	12.13
Strawberry †	33	52.2	1.13	1.13	Hydenville †	66	38	53.2	12.13
Teviston	33	52.2	1.13	1.13	Iowa Hill *	66	38	53.2	12.13
Tucson (1) †	33	52.2	1.13	1.13	Julian †	66	38	53.2	12.13
Walnut Ranch	33	52.2	1.13	1.13	La Grange *	66	38	53.2	12.13
<b>Arkansas.</b>	0	0	0	0.58	Lewis Creek	66	38	53.2	12.13
Arkansas City †	78	29	61.2	0.10	Loomis	66	38	53.2	12.13
Camden †	78	29	61.2	0.10					
Conway	78	29	61.2	0.10					

#### Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<b>California—Cont'd.</b>	0	0	0	Ins.	<b>Georgia—Cont'd.</b>	0	0	0	Ins.
Los Banos *.....	62	35	50.4	5.54	Milledgeville*†.....	73	25	55.8	0.39
Los Gatos (1).....	62	35	50.4	5.54	Monticello†.....	73	25	54.6	0.88
Mendocino.....	62	35	50.4	5.54	Point Peter*.....	73	25	53.8	0.85
National City†.....	68	34	55.9	8.13	Quitman (1)*.....	76	33	60.0	T.
Needles.....	75	29	50.5	3.30	Woolley's Ford.....	72	22	51.2	.....
Oakland (1)*.....	67	34	49.9	13.38	<b>Idaho.</b>				
Oroville.....	61	34	49.3	13.59	Boise Barracks.....	53	8	32.9	1.48
Pasadena.....	67	33	52.4	17.05	Era†.....	49	0	26.6	.....
Presidio of San F.....	64	33	50.7	13.97	Fort Sherman.....	44	0	30.4	5.85
Riverside*.....	63	32	51.6	6.87	Kootenai†.....	42	4	25.7	3.70
Sacramento (1).....	60	27	44.1	8.59	Soda Springs†.....	45	18	27.4	5.54
Salinas (1)*A.....	65	35	49.3	8.72	<b>Illinois.</b>				
San Diego B'ks.....	66	37	57.1	7.38	Aurora (1)†.....	61	13	37.4	.....
Santa Barbara (1).....	68	40	54.2	10.64	Aurora (2)*.....	65	13	39.5	2.53
Santa Clara*.....	63	33	50.8	10.78	Beardstown†.....	65	15	42.8	0.40
Santa Maria.....	68	32	52.2	6.71	Beason.....	65	15	42.8	1.50
Sonoma.....	61	36	51.0	11.47	Belvidere.....	58	15	37.7	1.88
Steeles.....	61	36	51.0	11.60	Centralia.....	70	18	48.5	1.60
Stockton (1).....	61	36	51.0	11.60	Collinsville.....	73	19	48.8	1.30
Susanville†.....	52	2	32.9	8.55	Dwight.....	65	15	41.2	1.79
Upper Mattole.....	72	30	45.4	29.36	Flora.....	71	19	48.0	2.11
Vacaville (1)*.....	62	32	48.6	12.95	Fort Sheridan.....	60	13	39.2	4.75
Walla Walla Creek*.....	53	12	33.0	8.09	Gibson City*.....	66	13	41.6	1.75
Walnut Creek.....	62	33	49.3	9.94	Golconda*.....	74	24	53.0	2.53
Wheatland.....	59	31	46.9	7.51	Grand Tower†.....	71	16	46.8	1.57
Willow (1)†.....	60	29	45.4	8.12	Greenville.....	67	11	41.0	2.02
<b>Canada.</b>					Griggsville*.....	67	11	41.0	2.02
McGill Col. Observ- atory, Montreal.	46	-7	23.8	4.39	Hennepin.....	69	5	38.9	1.45
<b>Colorado.</b>					Hilton*.....	66	8	45.9	1.41
Delta†.....	56	12*	33.8	3.15	Irishtown.....	66	8	45.9	1.48
Eagle Farm.....	66	3	32.0	0.02	Jordans Grove*.....	72	21	48.3	1.66
Fort Collins.....	66	3	32.0	0.02	Lacon.....	63	12	42.1	1.77
Fort Crawford.....	59	0	38.0	1.20	Lake Forest.....	60	9	36.8	2.66
Fort Lewis.....	52	-5	31.3	7.68	Lanark*.....	61	9	38.2	2.63
Fort Logan.....	70	1	41.1	0.30	Louisville.....	70	24	48.3	1.60
Fraser†.....	70	-24	15.8	1.88	Martinsville.....	68	24	47.1	0.91
Fruita†.....	70	-24	15.8	1.88	Mascoutah*.....	76	16	45.2	1.60
Georgetown.....	53	7	34.5	0.70	Mattoon*.....	66	20	45.2	2.25
Greeley.....	59	6	34.8	0.22	McLeansborough.....	72	21	51.4	1.77
La Porte.....	59	6	34.8	0.22	Mount Carmel†.....	70	22	47.6	3.96
Le Roy.....	59	6	34.8	0.22	Olney.....	70	22	47.6	3.96
Livermore.....	59	6	34.8	0.22	Oneida.....	66	8	40.5	1.90
Middle Box Elder.....	59	6	34.8	0.22	Oswego*.....	62	12	38.3	1.91
Palmer Lake.....	70	3	37.6	0.45	Ottawa†.....	64	18	42.1	1.80
Rocky Ford.....	70	3	37.6	0.45	Palestine.....	72	23	48.6	1.93
San Luis Ex.Sta.....	56	-9	31.8	1.23	Pana.....	70	20	48.2	4.33
Upper Pine.....	56	-9	31.8	1.23	Pekin.....	66	10	43.2	1.16
<b>Connecticut.</b>					Peoria (1)*.....	65	14	43.5	1.33
Birmingham.....	59	6	34.5	0.70	Peoria (2).....	65	14	43.5	1.33
Canton.....	61	4	38.0	2.89	Philo.....	67	16	43.4	3.04
Clark's Falls.....	61	4	38.0	2.89	Pontiac.....	64	14	41.4	1.65
Colchester.....	65	8	37.3	3.01	Riley.....	65	11	36.2	1.44
Falls Village.....	65	8	37.3	3.01	Rockford.....	61	14	37.8	2.88
Fort Trumbull.....	65	13	38.4	1.71	Rock Island Arsenal.....	65	10	41.3	1.96
Hartford (1).....	65	6	34.6	3.26	Rushville.....	66	13	41.7	1.20
Hartford (2).....	65	6	34.6	3.26	Sandwich*.....	65	18	41.3	1.82
Lake Konomos.....	65	6	34.6	3.26	Sycamore*.....	60	13	37.3	1.52
Lebanon.....	65	6	34.6	3.26	Warsaw†.....	60	13	37.3	1.52
Mansfield.....	63	5	35.1	2.88	Watseka.....	65	18	41.9	1.53
Middletown.....	66	6	35.0	2.79	Wheaton*.....	60	12	36.7	.....
New Britain.....	66	6	35.0	2.79	White Hall*.....	70	14	47.0	0.06
New Hartford (1)*.....	54	-2	25.1	3.03	Winnebago.....	62	11	36.6	2.83
New Hartford (2).....	54	-2	25.1	3.03	Woodstock.....	56	6	34.1	2.20
Shelton.....	65	12	36.5	1.98	<b>Indiana.</b>				
Southington*.....	64	6	35.4	2.54	Angola.....	64	17	42.3	2.34
South Manchester.....	64	6	35.4	2.54	Blue Lick.....	66	27	49.6	2.49
Thompson.....	62	6	34.8	2.66	Butterville*.....	65	23	47.3	2.77
Uncasville.....	62	6	34.8	2.66	Cannelton.....	71	19	45.0	2.81
Voluntown*.....	60	11	36.6	3.07	Columbia City.....	64	18	40.7	2.10
Wallington.....	63	7	35.5	2.65	Columbus.....	66	24	46.4	2.59
Waterbury.....	63	7	35.5	2.65	Connorsville.....	66	20	45.7	3.04
West Simsbury.....	63	7	35.5	2.65	Dana*.....	70	25	45.2	2.15
<b>Delaware.</b>					De Gonia Springs.....	70	25	45.1	3.65
Kirkwood*.....	22	42.2	.....	.....	Delphi.....	64	16	40.7	1.79
District of Columbia.					Evansville†.....	64	16	40.7	1.79
Kendall Green*.....	68	25	45.8	.....	Farmland.....	64	26	45.8	1.77
Washington B'ks.....	70	20	44.4	0.30	Franklin.....	67	31	45.6	3.00
<b>Florida.</b>					Huntingburgh.....	68	28	50.0	4.55
Altamonte Springs†.....	82	45	66.1	0.00	Huntington†.....	69	21	49.6	2.77
Alva†.....	85	43	64.1	0.16	Jeffersonville.....	69	21	49.6	2.77
Archer†.....	84	35	62.8	0.00	La Fayette.....	68	19	43.8	3.01
Fort Barrancas.....	80	27	61.5	0.39	Logansport.....	68	19	43.8	3.01
Fort Meade*.....	80	43	64.3	0.00	Marengo.....	71	30	51.2	4.90
Homeland*.....	82	46	64.2	0.00	Marion.....	66	20	43.3	3.60
Lake City†.....	83	34	61.5	0.00	Mauzy.....	65	12	41.8	2.13
Madison†.....	72	35	61.4	0.00	Mount Vernon (1)†.....	68	25	49.0	3.41
Manatee†.....	90	44	63.0	0.00	Mount Vernon (2).....	68	25	49.0	3.41
Matanzas*.....	78	53	62.9	0.21	Muncie.....	65	22	46.6	.....
Merritt's Island†.....	79	52	67.7	0.00	Point Isabel*.....	65	22	43.5	5.20
Ocala*.....	78	46	60.6	0.00	Princeton.....	70	24	49.0	3.60
St. Francis B'ks.....	76	43	62.5	0.12	Richmond.....	68	15	43.0	3.90
Tallahassee.....	78	32	58.8	0.00	Rockville.....	76	19	47.2	4.05
Villa City†.....	80	50	64.5	T.	Rushville†.....	76	19	47.2	4.05
<b>Georgia.</b>					Sealsville.....	74	26	51.5	2.01
Athens (1).....	72	26	55.2	0.63	Seymour.....	67	24	48.0	3.44
Athens (2)†.....	72	26	54.8	0.58	Shelbyville.....	66	28	46.6	4.35
Camilla*.....	80	32	56.4	T.	Spiceland.....	67	19	46.5	3.06
Diamond*.....	82	32	55.2	1.10	Sunman†.....	68	19	45.0	3.40
Forstyth*.....	82	32	61.3	0.79	Vevay.....	72	18	49.0	2.81
Fort McPherson.....	74	26	56.3	0.72	Vincennes†.....	64	23	45.3	2.14
Gillsville*.....	76	30	59.8	0.39	Worthington.....	64	23	45.3	2.14
Hephzibah*.....	76	32	59.0	0.06	<b>Indian Territory.</b>				
Jesup.....	76	32	59.0	0.06	Cantonment.....				0.00
Marietta†.....	73	22	54.7	0.56	Euftaula†.....	78	22	53.5	0.20
					Fort Gibson.....	78	22	53.5	0.20



## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
Indian Ter.—Cont'd.	0	0	0	Ins.	Kansas—Cont'd.	0	0	0	Ins.
Fort Reno	74	14	52.6	0.05	Monument	68	6	41.8	0.00
Fort Sill	78	21	52.3	0.00	Morse	60	18	36.0	0.00
Fort Supply	81	11	49.2	0.00	Oakley	70	7	46.4	0.00
Guthrie	74	18	52.2	0.05	Oberlin	72	5	41.8	0.00
Tulsa	74	18	52.2	0.00	Offerle	68	15	41.8	0.00
Iowa.					Ogallah	68	15	41.8	0.00
Amana	64	8	37.6	0.86	Quinter	68	4	41.2	0.00
Bancroft	52	2	32.1	1.40	Richfield	80	18	47.7	0.00
Belle Plaine	66	6	30.0	0.63	Rome	74	8	47.6	0.02
Blakeville	66	6	34.6	2.39	Russell	68	10	47.0	0.00
Carroll	65	5	35.8	0.71	Salina	70	12	44.4	0.00
Carson	67	6	37.7	0.10	Scott City	75	14	47.1	0.00
Cedar Rapids	64	10	38.6	1.62	Sedan	75	11	49.1	0.71
Clarinda	68	2	39.3	0.25	Seneca	70	1	41.9	0.01
Cresco	57	3	31.3	1.33	Sharon Springs	70	17	41.7	0.00
Des Moines	59	5	39.8	1.11	Shields	69	10	41.8	0.00
Elkader	58	2	34.2	1.00	Tribune	66	8	42.0	0.01
Eagle Grove	50	4	34.9	3.20	Vesper	70	10	47.8	0.00
Fayette	62	4	33.1	2.85	Victoria	70	10	47.8	0.00
Fort Madison	66	8	41.6	1.21	Wakefield	70	10	47.8	0.00
Glenwood (1)	76	4	41.7	0.29	Wa Keeney	70	10	43.7	0.00
Glenwood (2)	66	2	34.8	0.26	Walker	70	2	40.9	0.00
Grinnell	65	7	35.6	1.28	Wallace	74	6	46.2	0.00
Hampton	60	2	31.7	1.94	Wellington	65	12	42.2	0.00
Humboldt	58	5	33.6	0.86	Weskan	70	8	47.0	0.00
Independence	61	10	35.0	1.24	Wilson	70	16	44.6	0.00
Iowa City	63	17	40.9	1.13	Winona	74	6	46.0	0.15
Larrabee	54	1	31.7	1.36	Yates Center	74	6	46.0	0.15
Le Claire	54	1	31.7	1.36	Kentucky.				
Logan	65	5	39.6	0.14	Ashland	73	13	44.1	1.87
Manson	60	8	35.6	1.55	Bowling Green	73	25	55.8	1.92
Maquoketa	63	8	35.8	2.39	Burnside	73	25	55.8	1.92
McCausland	65	10	39.7	1.76	Catlettsburgh	72	23	52.0	1.82
Monticello	65	4	36.9	1.55	Canton	72	23	52.0	1.10
Mount Pleasant	67	11	37.3	0.82	Earlington	74	23	53.3	1.25
Mount Vernon	64	5	37.8	1.05	Eddyville	74	23	53.3	0.88
Muscataine (2)	67	9	39.6	1.40	Falmouth (1)	66	15	46.0	1.37
Osage	67	9	39.6	1.40	Falmouth (2)	66	15	46.0	1.70
Oskaloosa (1)	67	6	39.5	0.75	Frankfort (1)	71	16	49.2	2.07
Sac City	60	5	33.0	1.30	Frankfort (2)	71	16	49.2	2.36
Storm Lake	54	5	32.2	0.76	Franklin	75	29	55.1	1.91
Vinton	65	5	36.4	0.75	Greensburg	75	29	55.1	1.70
Washington	56	10	40.9	0.93	Louisville	67	22	52.6	1.28
Webster City	58	2	33.0	1.05	Millersburg	67	22	52.6	0.75
Wesley	54	3	31.4	1.35	Mount Sterling	67	17	47.9	1.44
West Bend	51	4	31.6	1.18	Murray	72	17	52.4	0.63
Kansas.					Newport Barracks	70	17	47.0	2.04
Allison	4	35.1	0.01		Owenton	65	22	48.6	2.20
Arlington	74	4	44.2	0.00	Paducah	72	17	48.6	0.89
Augusta	63	18	47.3	0.00	Pellville	72	17	48.6	2.24
Belleville	63	18	47.3	0.00	Princeton	72	21	51.0	1.30
Bendena	63	18	47.3	0.00	Richmond	68	20	50.4	1.08
Brookville	76	8	46.3	0.00	Shelbyville	68	19	49.1	2.17
Bucklin	65	18	41.2	0.00	South Fork	76	23	51.5	1.70
Buffalo Park	68	12	43.8	0.00	Springfield	71	32	53.6	2.30
Bunker Hill	68	12	43.8	0.00	Williamsburgh	65	22	48.6	5.15
Burr Oak	68	2	36.9	2.00	Louisiana.				
Cairo	74	20	36.9	2.00	Abbeville	65.6	1.63		
Carneiro	72	10	41.5	0.00	Alexandria	62.0	0.92		
Cawker City	70	7	41.5	0.00	Amite City	82	25	62.0	1.20
Collyer	66	25	42.1	0.00	Bayou Sara	84	39	64.4	2.52
Concordia	74	2	40.2	0.00	Cameron	84	34	64.4	2.52
Conway	76	10	44.5	0.00	Chataignier	84	47	66.3	2.30
Cunningham	75	3	42.8	0.00	Clinton	77	30	59.6	1.69
Dorrance	74	6	41.5	0.00	Columbia	79	30	61.7	0.70
Elk Falls	80	29	48.9	0.20	Coushatta (1)	79	30	61.7	0.84
Ellis (1)	72	4	41.6	0.00	Coushatta (2)	79	30	61.7	0.84
Ellis (2)	67	10	44.8	0.00	Crowley	81	33	63.2	1.76
Ellsworth	60	18	41.6	0.00	Delhi	79	30	60.2	1.90
Emporia	72	9	45.2	0.00	Donaldsonville	79	30	60.2	1.45
Englewood	74	12	47.0	0.00	Emilie	78	29	61.6	0.50
Ft. Leavenworth (1)	73	7	46.2	0.03	Farmerville	79	32	58.7	0.75
Ft. Leavenworth (2)	70	7	42.5	0.07	Girard	77	35	61.8	2.18
Fort Riley	73	5	43.0	0.00	Grand Cane	77	35	61.8	0.60
Fremont	73	1	39.8	0.00	Grand Coteau	79	34	65.0	3.75
Globe	71	7	44.2	0.06	Hammond	79	28	61.0	0.84
Gorham	70	4	39.0	0.00	Houma	80	31	62.0	1.62
Gove City	78	5	40.4	0.00	Jackson Barracks	77	32	61.0	0.47
Grainfield	66	10	41.7	0.00	Jeanerette	79	31	65.2	2.12
Grenola	74	9	46.8	0.10	La Fayette (1)	79	32	63.7	2.47
Grinnell	76	13	47.1	0.00	Lake Charles	80	30	62.0	1.85
Havensville	68	3	42.2	0.00	Liberty Hill	82	30	62.0	1.71
Hays City	68	10	45.3	0.00	Luling	82	24	60.0	0.71
Horton	75	10	49.3	0.53	Mandeville	77	29	60.7	0.39
Independence	75	10	49.3	0.53	Marksville	80	30	63.8	1.08
Junction City	69	3	49.2	0.00	Maurepas	80	28	61.7	1.30
Kanopolis	71	9	45.5	0.19	Melville	82	27	63.8	2.71
Kansas City	72	4	47.9	0.27	Minden	75	35	61.6	1.03
Kellogg	72	4	47.9	0.27	Monroe	74	30	60.9	1.56
Kirwin	72	4	47.9	0.27	New Iberia	90	34	66.2	1.59
La Harpe	76	11	45.2	1.04	Plaquemine	81	23	61.0	1.44
Lakin	76	22	53.2	0.00	Pointe à la Hache	77	39	59.4	2.00
Lawrence	72	11	44.8	0.08	Port Eads	77	40	62.0	0.20
Lebo	74	6	45.8	0.19	Shell Beach	76	42	63.7	1.95
Lincoln	73	5	41.4	0.00	Thibodaux	80	30	62.2	1.20
Lisbon	72	16	45.0	0.00	Vidalia	82	31	63.5	1.00
Luray	71	4	41.3	0.00	Maine.				
Macksville	71	4	41.3	0.00	Bar Harbor	50	2	35.0	5.92
Manhattan (1)	75	0	41.5	0.02	Belfast	51	2	30.1	0.00
Manhattan (2)	75	0	41.5	0.02	Calais	53	1	38.4	4.43
Manhattan (3)	70	0	41.1	0.00	Cornish	46	9	23.0	3.13
Mankato	67	10	38.5	0.00	Fairfield	46	9	23.0	4.26
Marmaton	74	10	46.7	0.82	Farmington	66	11	42.2	0.00
McAlister	66	11	42.2	0.00	Fort Preble	51	5	35.5	5.15
McPherson	66	11	42.2	0.00					

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
Maine—Cont'd.					Michigan—Cont'd.				
Gardiner	56	1	29.2	5.51	Ann Arbor	62	16	37.4	3.61
Kennebec Arsenal	49	1	25.2	2.83	Arbela	56	6	24.8	3.05
Lewiston	47	2	26.4	5.00	Atlantic	61	13	34.8	2.50
Orono	50	2	27.5	3.40	Ball Mountain	61	13	34.8	2.68
Petit Menan *	46	6	31.5	.....	Bangor	62	17	39.0	2.06
West Jonesport	48	2	30.2	.....	Bear Lake	52	6	32.4	3.21
Maryland.					Bell Branch*	53	16	33.9	2.69
Barren Creek Sp'g	73	15	45.2	0.19	Benton Harbor	65	22	42.9	2.05
Cumberland (1)	66	18	43.2	1.63	Berrien Springs*	63	18	39.4	2.94
Cumberland (2)	75	22	46.1	2.06	Birmingham	63	16	37.3	2.63
Fallston	68	21	42.2	0.71	Bronson	62	16	35.4	1.91
Fort McHenry	69	21	45.0	0.32	Buchanan	62	17	39.4	2.79
Frederick	72	22	44.4	0.66	Calumet	39	8	25.9	4.06
Gaithersburgh *	72	20	38.8	.....	Cassopolis	62	21	38.5	2.59
Galena *	72	24	43.6	0.55	Caldwell	52	6	31.9	2.18
Gambrells *	72	28	42.8	0.12	Charlevoix.	52	10	33.0	0.91
Jewell	72	27	45.7	T.	Chase	55	8	32.4	3.12
Leonardtown	71	24	45.8	0.05	Chelsea	63	18	39.2	3.25
McDonogh	67	19	43.4	0.42	Clinton	62	15	40.8	.....
Mt. St. Mary's Col	67	11	42.2	1.82	Colon	62	19	36.3	2.27
Woodstock	68	19	42.7	0.63	Columbiaville	54	19	36.0	.....
Massachusetts.					Concord	63	14	37.6	2.01
Amherst	62	3	35.7	2.92	Crawford	58	31	29.1	2.76
Amherst Ex Sta (1)	64	4	33.5	2.85	Crystal Falls	58	31	29.1	2.76
Amherst Ex Sta (2)	64	4	33.5	2.85	Deer Lake	65	14	33.1	4.67
Blue Hill (sum't)	62	8	35.1	2.24	East Tawas	54	9	34.3	2.43
Blue Hill (base)	64	10	36.6	2.23	Eden	62	15	37.1	2.17
Blue Hill (valley)	65	11	35.8	2.25	Evart	54	2	29.6	4.48
Boston	62	3	35.7	2.92	Fitchburgh	63	12	35.2	3.16
Brewster	58	21	39.5	2.28	Flint	63	12	35.2	2.95
Cambridge (1)	61	9	35.8	2.22	Fort Brady	43	1	27.8	2.80
Cambridge (2)	61	9	35.8	2.22	Fort Mackinac	53	7	30.8	3.50
Chestnut Hill	64	8	36.3	2.66	Fort Wayne	55	19	35.6	3.81
Chicopee	64	8	36.3	2.66	Fremon't*	56	16	34.7	4.36
Clinton	64	8	36.3	2.66	Gaylord	44	2	28.2	.....
Cotuit	56	23	37.6	2.34	Gladwin	53	3	32.6	3.52
Deerfield*	62	8	32.6	.....	Grand Rapids	60	16	37.2	3.49
Dudley	66	7	34.0	2.80	Grape	65	16	38.7	4.87
Fall River (1)	60	14	39.1	2.55	Grayling	50	2	31.5	4.66
Fall River (2)	61	11	37.3	3.20	Gulliver Lake	50	2	31.5	4.66
Fitchburg (1) *	60	6	32.9	3.22	Hanover	62	18	39.5	1.67
Fitchburg (2)	62	5	33.8	3.48	Harrisville	56	10	31.8	4.34
Fort Warren	60	12	34.6	1.64	Hart	55	15	37.0	2.30
Frammingham	64	6	36.7	3.15	Hastings	61	31	38.0	2.70
Gilbertville	58	1	33.0	3.92	Hayes	60	15	35.6	3.36
Groton	61	3	34.6	3.05	Hillman	56	2	30.6	2.06
Heath	56	4	28.4	.....	Hillsdale	61	18	39.3	2.37
Holyoke	58	6	35.8	2.76	Highland Station *	61	15	35.8	2.45
Kendall Green	62	3	33.9	3.06	Hudson	63	10	37.0	2.24
Lake Cochituate	67	1	34.4	2.70	Ionia	61	3	39.4	3.77
Lawrence	61	6	33.4	3.22	Ivan	50	5	30.5	3.71
Leicester	58	3	32.8	3.03	Jeddo	60	11	34.6	4.03
Leominster	62	16	36.8	3.54	Kalamazoo	63	14	40.2	2.30
Long Plain*	60	6	33.8	2.71	Lansing	62	17	37.2	2.68
Lowell (1)	64	4	34.2	.....	Lathrop	46	8	27.3	2.84
Lowell (2)	64	4	34.2	.....	Madison	62	13	38.1	2.77
Lowell (3)	64	7	34.9	.....	Manchester	62	13	38.1	2.77
Ludlow	67	2	36.2	3.45	Marshall	62	13	37.6	2.31
Lynn	60	10	35.9	2.97	May	58	16	35.6	3.06
Mansfield	62	9	35.0	3.43	Mio	52	2	29.7	3.89
Medford	62	9	35.0	3.43	Montague	51	13	35.4	3.60
Middleborough	63	11	36.2	2.35	Mottville	64	11	38.8	2.04
Milton *	61	12	37.4	2.36	Noble	64	11	38.8	2.04
Monson	63	3	33.4	3.31	North Aurelius	61	11	35.3	2.16
Mount Nonotuck	63	3	33.4	3.31	North Marshall	61	11	35.3	2.16
Myatie Lake	63	3	33.4	3.31	Olivet	60	13	36.1	2.56
Myatie Station	63	3	33.4	3.31	Otsego	58	17	36.3	.....
Nahant	58	12	36.4	2.63	Ovid	60	11	35.6	2.71
New Bedford (1)	56	13	37.7	2.63	Parkville	60	11	35.6	2.71
New Bedford (2)	56	13	37.7	2.63	Paw Paw	63	16	38.4	2.55
New Bedford (3)	56	13	37.7	2.63	Pontiac	60	18	37.1	2.58
Newburyport (1)	63	8	35.3	3.52	Pulaski *	58	20	36.7	1.75
Newburyport (2)	63	8	35.3	3.52	Rawsonville *	62	18	39.1	3.00
Northampton	60	6	34.1	3.29	Romeo	62	13	35.2	3.13
North Billerica	64	7	34.8	2.30	Rosecommon	52	5	30.6	3.87
Plymouth *	62	21	39.8	1.30	Saint Ignace	44	5	29.6	3.57
Princeton	59	0	31.9	2.87	Saint John's	61	14	36.7	3.12
Randolph	60	0	31.9	2.87	Sand Beach	55	8	34.6	3.25
Roberts' Dam	60	0	31.9	2.87	South Albion	61	24	41.6	2.57
Royalston *	60	10	37.0	7.98	Standish	54	9	30.8	4.60
Salem (1) *	62	10	36.8	.....	Stanton	59	10	37.9	2.87
Salem (2)	62	10	36.8	.....	Stockbridge	59	10	37.9	2.87
Somerset *	62	14	39.0	2.37	Traverse City (1)	54	6	34.2	4.04
South Hingham	61	8	34.8	2.47	Traverse City (2)	53	8	33.2	4.04
Springfield Army *	61	4	34.8	3.17	Thornville	61	19	38.0	3.09
Taunton (1)	67	12	35.2	2.55	Vandalia	60	17	38.0	2.19
Taunton (2)	65	11	36.8	2.69	Vienna	60	17	38.0	2.19
Valhalla	61	8	34.8	2.47	Washington	62	15	35.8	2.77
Wellesley	64	7	35.6	2.68	Weldon Creek	57	7	33.6	3.59
Westborough *	61	7	30.3	2.76	West Branch	52	9	32.7	4.72
Winchester	62	0	31.9	2.87	Williamston	60	20	36.5	2.55
Worcester (1) *	62	5	34.3	3.26	Ypsilanti (1)	59	12	35.4	3.39
Worcester (2)	62	6	30.4	.....	Ypsilanti (2)	62	17	38.6	3.14
Mexico.					Minnesota.				
La Logia	91	47	66.8	.....	Alexandriat	54	2	29.6	2.70
Leon de Aldemas	78	38	56.6	T.	Seldon *	54	2	31.0	1.25
Texico	68	36	53.2	0.04	Fergus Falls	54	2	29.6	2.70
Tonto Banda	78	58	70.8	0.59	Fort Ripley	48	6	29.1	0.93
Opotico *	78	58	70.8	0.59	Fort Snelling	48	6	29.1	0.93
Michigan.					Le Sueur *	50	10	29.6	3.06
Adrian	64	11	38.2	3.11	Minneapolis *	44	8	27.5	1.26
Albion (1)	60	20	38.3	3.50	Morris	44	17	23.6	0.77
Albion (2)	60	20	38.3	3.50	Ortonville	44	17	23.6	0.77
Allegan	60	8	36.2	2.49	Redwood Falls	44	17	23.6	0.77
Alma	60	8	36.2	2.49	Saint Charles *	54	2	29.6	2.70

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Ins.
	Max.	Min.	Mean		
<b>Minnesota—Cont'd.</b>	°	°	°	Ins.	Ins.
Tracy f.	64	7	35.4	0.44	0.44
<b>Mississippi.</b>	°	°	°	°	°
Agricultural Col'ge	75	32	60.1	0.77	0.77
Batesville f.	78	22	60.0	0.30	0.30
Booneville *	78	25	59.8	0.98	0.98
Brookhaven f.	80	26	61.6	1.50	1.50
Canton	78	28	60.0	1.10	1.10
Columbus f.	78	22	59.3	0.60	0.60
Corinth f.	79	24	55.4	0.81	0.81
Edwards f.	77	26	60.6	1.65	1.65
Fayette	79	30	63.3	1.04	1.04
Greenville	76	27	59.3	1.05	1.05
Holly Springs (1) f.	70	33	58.6	0.40	0.40
Holly Springs (2) f.	70	33	58.6	1.00	1.00
Jackson f.	76	24	52.5	0.42	0.42
Kosciusko f.	78	27	60.0	0.85	0.85
Lake f.	76	30	58.0	1.25	1.25
Lamar A.	80	30	60.3	0.03	0.03
Logtown	77	30	61.6	1.82	1.82
Louisville f.	82	22	58.8	1.01	1.01
Moss Point	76	34	61.6	0.40	0.40
Okalona f.	77	25	59.0	1.27	1.27
Palo Alto	77	30	61.6	1.82	1.82
Pearlington f.	77	30	61.6	1.82	1.82
Port Gibson f.	77	30	61.6	1.82	1.82
Pontotoc	79	28	58.2	0.67	0.67
Riensi *	78	30	59.8	1.02	1.02
Water Valley *	79	28	61.9	0.96	0.96
Waynesboro' (a) f.	75	35	58.4	0.99	0.99
Yazoo City f.	75	35	58.4	1.24	1.24
<b>Missouri.</b>	°	°	°	°	°
Appleton City	66	9	45.0	1.34	1.34
Brunswick	66	9	45.0	1.34	1.34
Carthage f.	73	15	52.2	0.36	0.36
Conception	67	7	42.5	0.00	0.00
Craig	75	2	45.4	0.00	0.00
Excelsior Springs *	70	8	43.2	0.08	0.08
Fayette f.	72	11	47.1	0.98	0.98
Frankford (1) f.	72	11	40.4	1.02	1.02
Glasgow	72	10	46.1	1.42	1.42
Grand Pass	69	10	45.7	0.40	0.40
Harris	65	6	41.1	0.09	0.09
Harrisonville f.	74	24	46.0	0.55	0.55
Hermann f.	75	16	47.7	1.42	1.42
Ironport	76	18	52.2	4.05	4.05
Jefferson Barracks	75	16	47.7	1.42	1.42
Jerome	75	16	47.7	1.42	1.42
Kansas City	70	10	46.0	0.25	0.25
Kidder	75	10	48.2	1.20	1.20
Lamont	75	10	48.2	1.20	1.20
Louisiana Bridge f.	75	10	48.2	1.20	1.20
Miami	70	10	46.1	0.51	0.51
Nevada	74	12	50.0	0.14	0.14
New Frankfort *	70	12	46.3	1.50	1.50
New Haven *	73	24	51.1	0.50	0.50
Oak Ridge *	69	22	49.8	0.10	0.10
Oregon	73	6	42.9	0.10	0.10
Osark *	73	13	51.6	1.30	1.30
Princeton *	66	6	44.6	0.40	0.40
Saint Charles (1)	70	10	46.0	0.25	0.25
Saint Joseph	70	10	46.0	0.25	0.25
Bedalia	74	9	49.4	1.32	1.32
Shelbina	76	12	52.5	1.08	1.08
Steelville	76	12	52.5	1.08	1.08
Warrensburg *	78	8	45.1	1.36	1.36
Warrenton *	75	15	45.6	1.08	1.08
Willow Springs f.	76	12	52.4	1.85	1.85
Wither's Mill *	70	14	48.2	1.03	1.03
<b>Montana.</b>	°	°	°	°	°
Camp Poplar River.	39	-17	9.8	0.77	0.77
Fort Assiniboine	47	-14	20.6	0.15	0.15
Fort Custer	58	-4	28.3	0.28	0.28
Fort Keogh	53	-11	23.2	0.08	0.08
Fort Logan f.	44	-7	16.0	0.37	0.37
Fort Maginnis	57	-14	20.4	0.51	0.51
Fort Missoula	55	-10	16.8	0.71	0.71
Fort Shaw	59	-12	28.2	0.22	0.22
Galpin f.	55	-10	16.8	0.71	0.71
Glendive f.	53	-6	24.0	0.03	0.03
Kintyre	53	-6	24.0	0.03	0.03
Powder River f.	53	-4	26.6	0.07	0.07
Sheldon	44	-2	28.0	3.85	3.85
Virginia City	47	-3	25.0	0.69	0.69
<b>Nebraska.</b>	°	°	°	°	°
Allamore f.	76	-2	36.6	0.80	0.80
Anahey f.	79	-1	34.2	0.10	0.10
Ashland	69	7	37.0	0.10	0.10
Bingham	62	3	35.3	0.27	0.27
Craig	63	2	35.3	0.27	0.27
Creighton f.	57	0	31.1	0.33	0.33
Cretes	58	2	38.6	0.10	0.10
Culbertson (1) f.	62	8	29.0	0.75	0.75
David City f.	67	6	37.0	0.07	0.07
De Soto f.	72	7	37.0	0.00	0.00
Fairbury	72	7	37.0	0.00	0.00
Fairfield	64	6	35.2	0.10	0.10
Falls City f.	69	4	43.8	0.00	0.00
Fort Niobrara	63	-14	31.6	0.72	0.72
Fort Omaha	70	-5	37.0	0.10	0.10
Fort Robinson	66	-1	38.0	0.78	0.78
Fort Sidney	66	-5	36.2	1.15	1.15
Franklin	68	-3	37.4	0.11	0.11
Frederick	66	-3	37.4	0.11	0.11
Grand Island A.	66	-3	37.4	0.11	0.11
Grant	66	-3	37.4	0.11	0.11

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Ins.	Stations.	Temperature. (Fahrenheit.)			Precip'n.	Ins.
	Max.	Min.	Mean				Max.	Min.	Mean		
<b>New York—Cont'd.</b>	°	°	°	°	°	<b>Ohio—Cont'd.</b>	°	°	°	°	°
Auburn	67	5	36.7	3.07		Cleveland	66	19	42.2	2.95	
Boyd's Corners*	66	6	37.4	2.94		College Hill	66	22	47.6	1.50	
Canton†	49	-6	28.2	3.63		Columbus Barracks	66	18	44.7	2.04	
Cent'l Park, N. Y. City	64	13	40.0	1.92		Dayton	68	30	46.2	2.69	
Conestoga f.	50	0	28.6	6.14		Demos	64	19	43.9	3.03	
Coopers town *	55	3	32.7	2.68		Elyria	66	19	41.4	3.05	
David's Island	66	11	38.5	3.22		Findlay	67	17	42.3	3.56	
Eden*	60	10	39.0	7.42		Fostoria	67	22	42.2	3.91	
Elmira†	62	8	37.3	2.18		Garrettsville	65	4	38.6	3.85	
Factoryville†	61	6	34.5	2.38		Georgetown.	72	15	47.1	1.68	
Fleming*	57	0	33.4	1.00		Gratiot*	69	11	45.9	1.00	
Fort Columbus	62	15	41.1	1.38		Greenville	64	20	43.4	2.00	
Fort Hamilton	67	14	41.3	1.55		Hanging Rock	73	17	40.7	1.40	
Fort Niagara	61	15	39.2	2.25		Hiram	66	10	39.7	4.03	
Fort Porter	55	10	37.7	3.61		Hudson	64	20	44.8	2.05	
Fort Schuyler	61	13	39.4	2.05		Jacksonborough	64	15	38.4	3.65	
Fort Wadsworth	66	15	40.7	1.85		Kent	65	20	43.4	3.65	
Geneva	62	9	37.7	2.50		Kenton*	77	20	43.4	2.42	
Hess Road Sta†	57	10	35.3	5.99		Logan	69	14	44.5	2.75	
Honeyhead Brook*	63	3	33.6	2.47		Lordstown	65	12	39.4	3.68	
Humphrey†	64	7	37.0	4.98		Manfield†	65	12	39.4	3.68	
Ilion†	59	9	34.3	3.55		Marietta†	65	16	45.7	2.43	
Ithaca	60	4	35.4	2.40		Marietta(1)	70	16	45.7	2.43	
Kendall	60	11	38.0	2.82		McConnellsville	69	14	45.0	2.42	
Kingston	64	5	35.0	4.41		Napoleon†	66	19	41.9	2.27	
Lyons	62	10	36.5	1.88		New Alexandria	64	15	43.3	2.67	
Madison Barracks	57	-3	31.4	5.80		New Comerstown.	66	14	41.3	2.67	
Malone	49	-5	27.4	1.57		North Lewisburgh.	67	13	44.3	3.00	
Marshall	66	10	37.8	2.54		Oberlin	65	19	42.5	3.55	
Middleburgh†	64	2	35.2	2.75		O. S. University	67	17	43.6	2.84	
Nineveh*	78	8	36.5	3.45		Orangeville*	67	8	34.9	2.25	
North Hammond†	56	-5	30.8	4.11		Ottawa	66	15	48.7	2.54	
Number Four†	50	-5	28.0	4.26		Poland*	66	15	48.7	2.54	
Palermo†	50	2	33.7	2.23		Pomeroy	66	15	48.7	2.54	
Palmyra*	63	16	38.8	2.33		Portsmouth(1)†	70	30	48.7	2.25	
Pendleton Centre*	55	11	33.8	3.08		Portsmouth(2)	70	30	48.7	2.25	
Perry City	56	-3	33.5	2.03		Salineville*	65	15	41.0	3.05	
Plattsburgh B'ks	55	-5	29.3	3.39		Shanessville*	59	21	42.5	3.05	
Port Jarvis	64	5	31.9	3.75		Shiloh*	65	20	42.6	3.05	
Potsdam*	53	-8	28.7	4.13		Sidney†	66	19	43.5	4.14	
Queensbury*	65	0	27.8	4.13		Springborough	66	19	43.5	4.14	
Rome	58	8	33.0	3.55		Tiffin	70	21	43.5	3.60	
Schenectady*	59	5	35.8	1.68		Upper Sandusky	65	20	42.7	2.52	
Setauket	64	17	41.5	1.68		Vienna*	63	9	38.1	2.48	
South Canisteo*	59	7	34.4	1.94		Wapakoneta	65	10	42.9	1.45	
South Kortright†	57	6	34.0	2.49		Watson	64	15	38.8	2.87	
Spencerport	57	12	35.8	5.14		Waverly	71	16	48.6	3.11	
Turin*	59	3	32.3	4.21		Waynesville	61	14	42.2	2.75	
Utica	62	7	33.2	3.20		West Milton*	68	20	44.9	4.25	
Watervliet Arsenal	64	5	34.3	2.40		Weymouth	66	15	40.7	3.88	
Wedgewood*	60	7	34.8	3.06		Wooster†	64	18	40.7	3.88	
West Point	60	4	35.4	2.21		Yellow Springs	66	15	44.2	2.83	
White Plains*	66	10	40.2	1.78		Youngstown	65	15	42.0	3.43	
Willet's Point	66	15	41.5	0.98		Zanesville†	65	15	42.0	2.06	
<b>North Carolina.</b>	°	°	°	°	°	<b>Oregon.</b>	°	°	°	°	°
Asheville(1)	72	16	51.2	0.97		Albany†	52	24	39.0	6.58	
Asheville(2)	76	23	52.5	1.50		Bandon*	58	39	45.3	11.80	
Chapel Hill	76	23	52.5	1.50		East Portland.	53	22	39.0	2.28	
Charlotte	73	18	51.2	0.35		Eola	51	18	36.1	5.23	
Clear Creek*	73	18	51.2	0.35		Grant's Pass†	53	23	37.2	6.65	
Curruck Inlet	71	14	45.4	0.80		Silver Lake	51	10	20.6	1.31	
Douglas	72	12	47.6	0.90		Tillamook†	51	14	39.2	10.24	
Franklin*	64	8	40.1	6.38		<b>Pennsylvania.</b>	°	°	°	°	°
Highlands	72	22	52.9	0.50		Allegheny Arsenal.	66	19	44.6	2.99	
Hot Springs	70	19	48.9	1.68		Altoona	65	21	44.0	3.42	
Lenoir*	67	13	47.2	0.92		Annvile	68	20	41.6	3.00	
Marion	72	14	48.2	0.30		Aqueduct*	70	15	39.4	2.45	
Mount Airy	72	14	48.2	0.30		Bethlehem	68	12	40.0	1.60	
Mount Holly†	72	14	48.2	0.30		Blooming Grove*	62	7	36.8	3.00	
Mount Pleasant	76	20	51.0	0.60		Blue Knob*	60	13	37.4	0.58	
New Bern*	72	20	49.2	0.40		Brookville†	66	11	43.4	3.30	
Pittsborough*	72	20	49.2	0.40		Cannonsburgh	68	11	43.4	3.30	
Raleigh	77	27	53.0	0.40		Carlisle	70	15	39.6	2.44	
Salisbury	72	20	49.2	0.40		Catawissa	62	17	39.0	2.41	
Soapstone Mount*	72	20	49.2	0.40		Centre Valley	73	19	40.7	2.30	
Southern Pines†	75	27	57.8	1.00		Chambersburgh.	64	15	37.9	2.03	
Washington	74	26	49.5	0.40		Charleeville	66	12	39.7	1.63	
Weidort*	74	20	50.0	0.80		Clarion(1)†	66	12	39.7	1.63	
Winston*	75	22	51.8	0.70		Clarion(2)	63	10	39.8	3.61	
<b>North Dakota.</b>	°	°	°	°	°	Cotatesville	69	17	39.1	1.60	
Davenport	44	-7	20.5	0.70		Confluence†	69	13	39.3	2.22	
Fort A. Lincoln	44	-8	14.8	0.60		Coopersburgh.	69	13	39.3	2.22	
Fort Buford	44	-11	14.8	0.60		Corry	60	8	37.3	5.09	
Fort Pembina	40	-20	11.8	1.02		Drifton	61	10	36.3	2.11	
Fort Totten	36	-11	10.4	0.00		Doylstown.	61	20	39.3	2.91	
Fort Yates	53	-5	22.3	0.28		Dyberry	64	8	33.3	2.30	
Gallatin	40	-12	16.6	0.03		Eagle's Mere	51	0	33.1	3.38	
New England City	50	-14	16.1	0.40		Easton	66	12	39.7	1.63	
Steele	43	-11	17.4	0.65		Edinborough	60	8	36.8	1.12	
Wahpeton	45	-4	22.4	0.18		Emporium	62	12	38.6	3.85	
<b>Ohio.</b>	°	°	°	°	°	F'sk of Nesheim.	66	20	40.2	1.65	
Akron	65	18	41.1	3.37		Franklin*	58	10	36.7	4.53	
Ashland*	62	18	41.0	3.59		Frankford Arsenal.	66	20	43.2	1.78	
Athens	67	14	45.7	2.63		Frederick	66	18	41.8	3.45	
Bangorville	64	12	40.8	3.22		Freeport†	66	18	41.8	3.45	
Belleve*	64	17	40.8	2.88		Germantown	66	18	41.8	3.45	
Bement*	68	20	41.6	2.81		Gettysburgh†	69	15	39.6	2.01	
Bucyrus	63	13	40.2	2.41		Girardville	64	16	38.3	3.31	
Caledonia†	66	17	41.1	3.48		Grampan Hills.	60	8	36.7	4.20	
Canton†	66	17	41.1	3.48		Greensborough†	65	17	39.5	3.03	
Carrollton	66	17	41.1	3.48		Greenville	65	17	39.5	3.03	
Celina	70	23	45.2	2.30		Hollidaysburgh.	64	10	41.0	3.30	
Circleville(1)†	66	16	45.1	2.73		Honesdale	61	8	35.5	3.30	
Circleville(2)	66	16	45.1	2.73							
Clarksville	66	16	45.1	2.73							



## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<b>Pennsylvania—Con.</b>					<b>Tennessee—Cont'd.</b>				
Huntingdon.....	69	12	39.9	3.14	Florence Station.....	71	30	55.3	1.50
Johnstown.....	67	10	42.6	4.62	Grand Junction.....	68	21	50.3	1.52
Kennett Square.....	67	10	38.8	0.49	Greenville.....	68	21	50.3	1.52
Lansdale.....	67	10	38.8	0.49	Hohenwald.....	68	21	50.3	1.52
Le Roy.....	67	10	38.8	0.49	Jacksborough.....	68	21	50.3	1.52
Lewisburg.....	67	10	38.8	0.49	Johnsonville.....	68	21	50.3	1.52
Lewiston.....	67	10	38.8	0.49	Kingston (1).....	68	21	50.3	1.52
Lock Haven.....	67	10	38.8	0.49	Kingston Springs.....	68	21	50.3	1.52
Lock No. 4.....	67	10	38.8	0.49	Leeville.....	68	21	50.3	1.52
Lynnport.....	67	10	38.8	0.49	Lewisburg.....	68	21	50.3	1.52
Mauch Chunk.....	67	10	38.8	0.49	Loudon.....	68	21	50.3	1.52
McConnellaburgh.....	67	10	38.8	0.49	Lynnville.....	68	21	50.3	1.52
Mesheppen.....	67	10	38.8	0.49	McKenzie.....	68	21	50.3	1.52
Myersburg.....	67	10	38.8	0.49	Milan (1).....	68	21	50.3	1.52
New Bloomfield.....	67	10	38.8	0.49	Nunnally.....	68	21	50.3	1.52
New Castle.....	67	10	38.8	0.49	Parksville.....	68	21	50.3	1.52
Nisbet.....	67	10	38.8	0.49	Riddletown.....	68	21	50.3	1.52
Oil City.....	67	10	38.8	0.49	Rockwood.....	68	21	50.3	1.52
Ottawa.....	67	10	38.8	0.49	Rogersville.....	68	21	50.3	1.52
Parker's Landing.....	67	10	38.8	0.49	Rugby.....	68	21	50.3	1.52
Petersburg.....	67	10	38.8	0.49	Savannah.....	68	21	50.3	1.52
Phillipsburg.....	67	10	38.8	0.49	Springdale.....	68	21	50.3	1.52
Pleasant Mount.....	67	10	38.8	0.49	Strawberry Plains.....	68	21	50.3	1.52
Point Pleasant.....	67	10	38.8	0.49	Trenton.....	68	21	50.3	1.52
Pottstown.....	67	10	38.8	0.49	Tullahoma.....	68	21	50.3	1.52
Quakertown.....	67	10	38.8	0.49	Watkins.....	68	21	50.3	1.52
Reading.....	67	10	38.8	0.49	Waynesborough.....	68	21	50.3	1.52
Rimersburg.....	67	10	38.8	0.49					
Salem Corners.....	67	10	38.8	0.49	<b>Texas.</b>				
Saltsburg.....	67	10	38.8	0.49	Austin (1).....	80	36	65.5	0.00
Seisholtzville.....	67	10	38.8	0.49	Austin (2).....	80	36	65.5	0.00
Selin's Grove.....	67	10	38.8	0.49	Brazoria.....	80	36	65.5	0.00
Smith's Corners.....	67	10	38.8	0.49	Camp Eagle Pass.....	80	36	65.5	0.00
Somerset.....	67	10	38.8	0.49	Camp Pecos.....	80	36	65.5	0.00
South Eaton.....	67	10	38.8	0.49	Camp Verde.....	80	36	65.5	0.00
State College.....	67	10	38.8	0.49	Childress.....	80	36	65.5	0.00
Swarthmore.....	67	10	38.8	0.49	College Station.....	80	36	65.5	0.00
Tionesta.....	67	10	38.8	0.49	Decatur.....	80	36	65.5	0.00
Tipton.....	67	10	38.8	0.49	Edinburg.....	80	36	65.5	0.00
Troy.....	67	10	38.8	0.49	Epworth.....	80	36	65.5	0.00
Tuscarora.....	67	10	38.8	0.49	Forestburg.....	80	36	65.5	0.00
Uniontown.....	67	10	38.8	0.49	Fort Bliss.....	80	36	65.5	0.00
Warren.....	67	10	38.8	0.49	Fort Brown.....	80	36	65.5	0.00
Waynesburg.....	67	10	38.8	0.49	Fort Clark.....	80	36	65.5	0.00
Wellsborough.....	67	10	38.8	0.49	Fort Davis.....	80	36	65.5	0.00
West Chester.....	67	10	38.8	0.49	Fort Elliott.....	80	36	65.5	0.00
Westtown.....	67	10	38.8	0.49	Fort Hancock.....	80	36	65.5	0.00
Wilkes Barre.....	67	10	38.8	0.49	Fort McIntosh.....	80	36	65.5	0.00
Wysox.....	67	10	38.8	0.49	Fort Ringgold.....	80	36	65.5	0.00
York.....	67	10	38.8	0.49	Gallinas.....	80	36	65.5	0.00
					Graham.....	80	36	65.5	0.00
					Hartley.....	80	36	65.5	0.00
					Hearne.....	80	36	65.5	0.00
					Houston.....	80	36	65.5	0.00
					Howe.....	80	36	65.5	0.00
					Huntsville.....	80	36	65.5	0.00
					Longview.....	80	36	65.5	0.00
					Miami.....	80	36	65.5	0.00
					New Ulm.....	80	36	65.5	0.00
					Panhandle.....	80	36	65.5	0.00
					Paris.....	80	36	65.5	0.00
					Round Rock.....	80	36	65.5	0.00
					San Antonio.....	80	36	65.5	0.00
					Sugar Land.....	80	36	65.5	0.00
					Waco (2).....	80	36	65.5	0.00
					<b>Utah.</b>				
					Beaver.....	55	6	38.0	3.79
					Bingham.....	57	11	39.7	4.37
					Fort Douglas.....	57	11	39.7	4.37
					Fort Duchesne.....	57	11	39.7	4.37
					Levan.....	58	4	34.3	8.50
					Losee.....	58	4	34.3	8.50
					Mount Carmel.....	58	4	34.3	8.50
					Mount Pleasant.....	58	4	34.3	8.50
					Nephi.....	58	4	34.3	8.50
					Ogden (2).....	58	4	34.3	8.50
					Park City.....	58	4	34.3	8.50
					Pricet.....	58	4	34.3	8.50
					Provo City.....	58	4	34.3	8.50
					Richfield.....	58	4	34.3	8.50
					Saint George.....	58	4	34.3	8.50
					Stockton.....	58	4	34.3	8.50
					<b>Vermont.</b>				
					Brattleborough (1).....	62	2	31.7	4.19
					Burlington.....	55	6	32.0	1.48
					Chelsea.....	50	7	26.2	3.52
					Cornwall.....	52	7	24.9	3.61
					East Berkshire.....	52	7	24.9	3.61
					Hartland.....	56	8	28.6	3.79
					Jacksonville.....	56	8	28.6	3.79
					Lunenburg.....	50	15	24.5	1.48
					Manchester.....	56	0	32.7	5.60
					Saint Johnsbury.....	50	10	23.9	0.70
					Stratford.....	50	8	28.8	3.00
					Vernon.....	58	0	32.3	4.55
					<b>Virginia.</b>				
					Abingdon.....	73	27	49.1	0.55
					Birdsboro.....	61	12	41.2	0.00
					Bolar.....	61	12	41.2	0.00
					Christiansburg.....	67	18	46.5	0.78
					Dale Enterprise.....	72	19	49.0	0.23
					Fort Monroe.....	69	19	48.5	0.54
					Fort Myer.....	71	20	45.8	0.23
					Lexington.....	72	15	48.4	0.03
					Liberty.....	72	15	48.4	0.03
					Marion.....	67	13	48.0	1.66

## Meteorological record of voluntary observers, &amp;c.—Continued.

Stations.				Temperature. (Fahrenheit.)			Precip'n.	Stations.				Temperature. (Fahrenheit.)			Precip'n.			
				Max.	Min.	Mean						Max.	Min.	Mean				
Virginia—Cont'd.								Wisconsin.										
Middletown †	73	17	42.8	0.36	Butternut*	67	14	33.1	1.73									
Mossingford †	73	20	46.7	0.57	Cadiz*	67	14	34.8										
Nottaway C. H.	76	15	49.4	0.61	Chippewa Falls†	67	14		2.06									
Petersburg †	73	23	47.8	0.67	Delavan	58	10	35.2	2.09									
Richmond †	70	21	51.2	0.57	Embarrass*	48	2	30.6	3.80									
Smithfield*	74	24	48.9	0.75	Fond du Lac	57	8	32.8	2.33									
Spottsville*	72	21	47.6	0.85	Glasgow	48	13	29.6	1.76									
Staunton	63	18	44.2	0.05	Grantsburg †	46	13	27.8	1.95									
Summit	69	15	44.2	0.00	Greenwood †	48	5	29.0	2.85									
University of Va.	69	15	44.2	0.00	Honey Creek*	58	10	35.8										
Woodstock †	69	15	44.2	0.46	Horicon	58	10	31.9	2.41									
Washington.								Lincoln*								24	38.4	2.61
Blakeley †	52	24	37.8	4.06	Madison	60	12	35.0	2.33									
Fort Canby	56	32	43.2	7.94	Manitowoc	60	8	30.4	3.06									
Fort Spokane	45	3	26.3	4.40	Medford †	60	8		2.18									
Fort Townsend	49	24	37.2	0.07	Neillsville*	48	2	27.4	0.40									
Fort Walla Walla	51	8	31.3	26.7	Oshkosh	56	8	34.0	2.83									
Vancouver B'ks	53	20	36.4	4.56	Phillips †	56	8		1.63									
West Indies.								Portage †								56	8	2.61
Grand Turk Island	84	78	79.5	2.28	Richland Centre†	61	5	32.8	2.20									
Hamilton, Bermuda	73	58	65.8	3.03	Summit Lake*	58	12	26.3	2.40									
West Virginia.								Viroqua*								6	26.4	0.05
Buckhannon †	66	20	44.4	2.78	Waucousta	49	2	30.9										
Charleston†	66	20	44.4	2.78	Wausau	49	2	26.4	0.85									
Ella	66	20	44.4	2.78	Wauzeka*	49	2	33.8										
Glenville	66	20	44.4	2.78	Wyoming.													
Harper's Ferry †	66	20	44.4	2.78	Carbon*	52	1	32.2	0.82									
Hinton	62	20	41.4	0.04	Carter†	47	15	27.9	0.97									
Kingwood*	62	20	41.4	0.04	Camp Pilot Butte	47	15	27.9	0.97									
Morgantown †	62	20	41.4	0.04	Camp Sheridan	47	15	27.9	0.97									
Oceana	67	16	46.9	1.80	Evanston	52	13	26.1	4.75									
Pleasant Hill*	62	10	41.8	1.70	Fort Bridger	47	19	24.6	1.28									
Point Pleasant †	62	10	41.8	1.70	Fort D. A. Russell	64	4	34.1	0.30									
Rowlesburg (1) †	63	12	45.5	3.05	Fort Laramie	70	2	37.5	0.00									
Rowlesburg (2) †	63	12	45.5	3.05	Fort McKinney	58	3	34.5	0.00									
Seven Pines	63	12	45.5	3.05	Fort Washakie	52	10	29.6	0.24									
Tannery*	70	6	46.4	0.15	Lander	49	3	30.3	0.12									
Tyler Creek*	79	20	51.1	3.03	Lusk†	58	8	35.3	0.09									
Weston †	79	20	51.1	3.03	Saratoga*	56	20	31.6	4.80									
Wheeling †	69	15	44.2	0.00	Sundance	56	20	31.6	4.80									
White Sulph' r Sp'gs.	69	15	44.2	0.00														

Reports received too late to be used in general discussion of weather for December, 1889.

Arizona.								California—Cont'd.											
American Flag				0.28	Brighton*	63	39	51.9	6.19										
American Ranch				4.02	Byron*	62	32	50.2	8.33										
Antelope Valley				5.86	Cactus*	80	49	63.0	2.02										
Ariz. Can. Co. Dam.				3.80	Castroville*	65	35	51.3	11.81										
Banghart*	81	26	51.6	4.35	Caliente*	62	40	53.0	3.65										
Benson*	72	29	50.2	1.33	Calistoga*	68	28	47.5	17.07										
Bisbee				0.29	Chico*	60	32	48.1	9.74										
Calabasas				0.83	Cisco*	40	20	31.3	25.57										
Chloride				7.53	Colfax*	62	30	41.6	21.85										
Casa Grande*	90	40	65.9	1.25	Colton*	74	32	58.2	7.41										
Dudleyville.				1.88	Corning*	70	32	47.6	10.11										
Duncan				0.75	Davisville*	65	36	51.7	9.02										
Eagle Pass		28	44.3	1.69	Delano*	67	33	53.0	1.93										
Flagstaff†	59	5	37.2	7.87	Downey*	56	32	42.1	25.83										
Florence†	75	31	54.6	2.06	Dunnigan*	70	38	59.0	10.44										
Gillette				6.15	Dunsmuir	62	27	49.7	9.66										
Holbrook*	68	18	45.0	0.91	El Dorado*	53	26	38.7	20.58										
Maricopa*	73	37	56.8	0.21	El Mirra*	57	34	47.9	14.94										
Mount Huachuca	77	25	54.8	0.55	El Verano*	64	32	47.8	14.85										
Oro				0.96	Emigrant Gap*	44	32	31.1	20.85										
Pantano*	75	35	53.8	3.73	Esperanza*	60	32	48.8	9.41										
Peoria	69	33	54.0	1.05	Farmington*	70	35	51.6	8.00										
Red Rock				0.05	Felton*	68	30	52.0	34.95										
Saint Johns				2.25	Florence*	80	39	58.7	13.14										
Show Low				5.63	Folsom*	65	35	48.7	11.25										
Signal †	67	31	52.8	5.22	Fresno*	66	40	53.3	3.80										
Silver King				6.60	Fruto*	64	31	48.9	10.38										
Stanton				0.62	Galt*	62	39	51.1	7.64										
Texas Hill*	74	45	54.7	8.63	Gilard*	58	28	42.7	4.69										
Tip Top †				0.72	Gilroy*	65	32	48.7	10.21										
Tres Alamos				1.57	Goshen*	65	28	48.1	19.25										
Tucson (2)*	75	34	50.7	7.55	Haywards* &	64	31	48.3	2.83										
Walnut Grove.				0.50	Hollister*	73	35	56.1	7.35										
Willcox*	78	34	55.4	1.80	Hornbrook*	50	17	35.9	2.92										
Williams	52	30	38.9	3.67	Indio*	75	40	56.9	3.29										
Willow Springs				0.87	ione*	62	32	49.1	6.41										
Winslow †	68	8	39.9	1.00	King City*	66	30	48.6	8.07										
Wood Cañon				1.00	Keeler*	67	30	49.3	0.56										
Woodruff				2.22	Keene*	60	30	44.8	5.17										
Yuma*	70	45	58.0	12.50	Kingsburgh*	68	33	51.0	3.64										
California.								Knight's Landing*								62	30	51.7	8.78
Alcade*	65	40	51.8	10.95	Lathrop*	60	36	51.9	7.60										
Almaden*	61	35	50.1	6.54	Laurel*	65	32	49.1	31.79										
Anaheim*	76	42	59.0	18.29	Lemoore*	78	30	53.8	2.87										
Antioch*	64	37	50.5	5.74	Livermore*	62	29	46.9	8.63										
Aptos*	65	35	52.3	1.75	Livingston*	67	41	52.0	5.68										
Athlone*	70	35	52.1	3.87	Los Angeles*	70	39	54.8											
Auburn*	58	37	47.0	11.09	Los Gatos (2)	64	32	52.3	19.94										
Bakersfield*	69	35	53.6	3.78	Mammoth Tank*	72	28	57.0	3.18										
Barstow †	64	27	49.5	1.00	Martinez	62	32	49.0	1.80										
Beatmont	60	35	48.5	4.66	Marysville	65	35	50.5	9.01										
Belmont*	65	34	49.8	1.20	Menlo Park*	62	34	50.3	10.85										
Berendo*	59	20	40.6	19.35	Merced*	62	40	51.5	5.59										
Bishop Creek*	58	20	40.6	3.05	Modesto*	66	38	50.9	5.31										
Boca*	49	20	28.8	9.61	Mojave*	77	30	49.0	7.30										
Borden	66	38	50.9																
Brentwood*	70	35	51.2																

## Reports received too late, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<i>California—Cont'd.</i>					<i>Colorado—Cont'd.</i>				
Montague	52	38	37.2	3.74	Longmont	70	4	39.8	0.04
Monterey	62	32	50.9	11.54	Loveland	51	10	29.6	0.00
Monterey (Hotel)					Magnolia	55	17	40.4	0.05
del Monte	64	35	53.0		Monte Vista	50	5	29.7	0.08
Mount Hamilton	46	29	35.2	13.19	Parachute	57	8	34.4	0.64
Napa	65	32	51.2	12.23	Rifle Falls	48	8	32.7	3.44
Newark	60	30	51.6	11.96	Ranch near Como	43	8	22.3	1.06
Newhall	66	26	49.9	15.70	River Bend	62	19	38.9	
Newman	60	35	47.9	5.52	Sedgwick				0.06
Niles	79	32	55.4	9.71	Thon	62	2	37.6	0.13
Norwalk	68	33	55.4	9.71	T. S. Ranch	60	11	36.8	2.22
Oakland (2)	66	36	51.7	12.36	Vilas				T.
Ontario	66	36	52.1	12.54	Watkins	68	18	40.1	0.25
Orland	58	35	47.9	6.80	West Cliff	54	0	38.8	0.05
Pajaro	66	32	51.5	14.12	Wigwam				0.23
Paso Robles	62	29	47.5	9.13	<i>Georgia.</i>				
Petaluma	61	33	49.3	10.12	Thomasville (1)	79	30	59.8	T.
Placerville	58	32	45.1	19.07	<i>Idaho.</i>				
Pleasanton	62	31	47.9	10.39	Lewisville	48	10	36.0	1.19
Pomona	76	44	68.1	11.53	<i>Indian Territory.</i>				
Porterville	78	35	55.3	3.23	Caddo Creek	76	26	56.8	
Puente	67	33	54.7	15.26	<i>Iowa.</i>				
Red Bluff	65	37	50.9	9.80	Clinton	65	10	38.2	1.68
Redding	57	30	43.6	17.66	<i>Kansas.</i>				
Rocklin	63	35	49.2	7.52	Halstead	70	5	44.3	0.00
Rumsey	62	35	47.6	12.07	Kingman				0.37
Sacramento (2)	60	37	49.1	6.37	<i>Massachusetts.</i>				
Salinas (2)	63	39	51.2	6.37	Fiskdale				2.63
Salton	77	30	57.5	3.79	Taunton (3)	65	10	36.9	2.68
Sanger Junction	72	36	55.4	4.71	Williamstown	60	3	33.2	3.30
San Ardo	64	34	49.7	7.16	<i>Michigan.</i>				
San Fernando	70	32	50.8	14.40	Berlin	63	9	36.5	2.94
San Gabriel	71	33	55.3	14.32	Big Rapids	56	11	36.8	4.91
San Jose	62	34	50.5	10.55	<i>Minnesota.</i>				
San Mateo	64	34	49.3	12.44	Crookston	40	9	17.9	0.22
San Miguel	68	33	52.3	6.72	Farmington	44	2	29.7	3.01
San Pedro	68	42	57.1	7.39	Grand Meadow	58	1	29.2	1.68
Santa Ana	70	38	57.2	12.09	L. Winnibigoshish	37	17	18.3	1.26
Santa Barbara (2)	76	38	56.0	10.33	Leach Lake	40	18	19.1	1.12
Santa Cruz	70	36	55.0	20.38	Mankato	50	1	31.7	2.57
Santa Margarita	61	29	47.9	15.68	Montevideo	47	14	25.8	1.76
Santa Monica	72	38	55.0		Northfield	47	0	29.7	2.22
Santa Paula	70	38	57.3	16.45	Owatonna	50	3	30.0	1.54
Santa Rosa	66	32	50.0	15.92	Pine River	38	10	18.9	0.93
Selma	63	32	49.8	3.64	Pokegama Falls	44	29	18.5	1.43
Seven Palms	83	40	59.2	4.64	Red Wing	49	0	29.8	1.94
Shingle Springs	65	34	48.9	17.35	Rolling Green	50	6	29.4	1.48
Sims	55	22	39.2	19.85	<i>Montana.</i>				
Sisson	49	17	32.5	9.48	Custer				0.04
Soledad	64	30	47.8	8.94	Kimball	65	0	37.8	
Soquel	70	38	55.0		<i>Nebraska.</i>				
South Side	64	34	46.7	12.78	Austin	50	2	31.8	2.66
South Vallejo	60	34	47.7	9.60	Battle Mountain	60	0	33.4	1.54
Spadra	71	36	54.3	7.69	Belmont	42	0	32.2	4.06
Stockton (2)	72	40	55.6	6.67	Beowawe (1)	54	3	31.3	1.88
Suisun City	62	36	51.1	10.18	Beowawe (2)	54	19	31.1	1.63
Summit	36	12	28.0	18.50	Brown's	54	2	38.1	1.38
Tehama	58	40	49.1	11.45	Candelaria	47	4	32.3	1.37
Tehachapi	55	25	39.6	5.30	Carlisle	54	20	31.4	3.45
Templeton	62	32	49.6	10.66	Crane's Ranch	59	1	31.8	2.20
Towles	47	28	38.2		Downeyville	59	1	31.8	2.20
Tracy	59	32	43.2	6.85	El Dorado	52	36	55.7	5.77
Traver	70	37	51.1	3.35	Elko (1)	52	14	31.0	2.42
Tropico	68	38	53.7	10.12	Elko (2)	54	20	31.0	3.96
Truckee	40	12	29.7	2.51	Ely	50	14	32.6	4.70
Tulare	70	39	53.1	2.60	Eureka	50	4	31.4	2.39
Turlock	65	37	51.9	6.53	Fenelon	55	13	27.0	3.75
Vacaville (2)	61	37	48.1	12.48	Ferguson's Ranch	59	5	36.4	1.00
Valley Springs	60	39	49.5	9.25	Genoa	52	12	31.0	7.85
Vina	57	32	48.9	12.16	Golconda	50	6	35.4	1.57
Volcano Springs	86	35	66.2	2.74	Gold Mountain	46	13	34.6	1.00
Westley	65	37	53.7	4.92	Hawthorne (1)	60	18	42.3	1.03
Whittier	80	39	60.2	0.00	Hot Springs (1)	60	0	34.7	0.70
Williams	48	32	38.9	7.50	Humboldt (1)	55	0	33.6	1.57
Willow	62	32	46.6	8.52	Lewer's Ranch	53	6	27.8	9.43
Winters	62	32	51.2	12.74	Mill City	57	4	31.3	8.44
Woodland	69	35	49.0	8.48	Palisade	54	7	34.0	4.23
<i>Colorado.</i>					Pioche	61	5	34.5	2.49
Agate	52	10	31.3	0.12	Reno	55	3	36.7	11.12
Apishapa	66	10	41.0	0.20	Reno State Univ.	52	7	32.0	2.31
Aroya					Rioville				4.35
Aspen	52	2	29.3	2.69	Saint Clair	51	5	32.3	1.71
Bennet	71	6	41.5	0.15	Sodaville	56	11	37.4	2.45
Boulder Canon					Tecoma	52	2	31.6	
Breckenridge	86	17	33.8	2.25	Toano	48	10	31.4	4.00
Brush					Tuscarora	48	11	25.2	9.28
Byers	64	8	42.4	0.12	Verdi	47	3	31.8	6.03
Canon City	69	11	44.4	0.25	Virginia City	47	11	31.9	4.17
Cheyenne Wells	65	12	39.8	0.00	Wadsworth	58	8	37.8	1.16
Climax	40	8	24.0	0.98	Wells	50	12	32.9	1.62
Deer Trail	60	6	34.7	T.	Winnemucca	50	4	35.3	3.83
Durango (1)					Yount's Ranch	64	27	48.2	4.41
Durango (2)					<i>New Mexico.</i>				
Elkhorn					Albuquerque	66	10	43.8	
Emma					Deming	72	20	48.2	0.00
First View	56	10	42.1		Lordsburg	74	25	50.6	0.10
Glenwood Springs	54	6	33.3	3.87	Nogal				0.07
Gunnison	48	24	24.7	1.28	Red Canon				0.00
Hardin					<i>North Dakota.</i>				
Hugo	60	24	37.8	0.65	Napoleon	49	9	20.9	0.69
Husted	64	1	40.6	0.28					
Idaho Springs	63	3	33.5	0.46					
Kit Carson	65	20	43.7						
Las Animas	73	6	41.9	0.00					
Leadville	45	4	26.0	1.67					

## Reports received too late, &amp;c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Oregon.</i>					<i>Texas.</i>				
Ashland	50	16	35.0	2.29	Brady	79	26	60.7	Ins. T.
Corvallis	52	23	38.8	6.44	Brenham	80	36	66.8	0.72
Creswell	52	23	39.2	6.94	Brownwood	79	28	60.6	0.01
Cascade Locks	44	19	37.0	8.46	Caddo Peak	80	28	60.4	T.
Forrest Grove	49	19	33.6	2.90	Colorado	82	22	59.4	0.03
Gardiner	53	30	38.4	12.72	Columbia	80	43	66.6	T.
Grass Valley	47	8	28.1	0.93	Dallas	84	30	61.4	0.00
Hood River	48	16	33.8	4.32	Durham				0.12
Hubbard	53	23	38.4	6.23	Duval	82	31	66.3	0.00
Huntington	53	1	29.3	2.65	Fort Worth	80	32	60.4	0.00
Jacksonville	48	19	36.2	5.92	Fredericksburgh	79	31	61.2	0.04
Lone Rock	56	5	28.6	0.98	La Grange				0.30
La Grande	46	10	28.0	0.88	Lampasas	79	28	62.7	
Nolin	46	11	28.0	0.65	Menardville	77	27	58.6	0.00
North Powder	47	8	24.4	1.10	Merkel				0.00
Pendleton	55	6	31.7	1.71	Mesquite	81	29	62.2	0.00
Saint Helena	52	24	37.5	5.00	New Braunfels	79	37	64.4	T.
Siskiyou	50	18	33.2	7.34	Ochiltree	71	30	49.6	0.00
Telocaset				1.20	Panther	81	31	62.5	T.
The Dalles	50	14	31.9	2.00	Silver Falls	84	14	56.1	0.00
Vernonia	50	19	36.4	8.47	Tyler	78	43	65.0	0.00
<i>South Carolina.</i>					<i>Utah.</i>				
Belmont	76	24	55.7	0.69	Blue Creek	49	15	36.0	2.40
Brewer Mine	77	20	54.1	0.60	Corlaine	58	5	35.3	4.53
Clinton	72	30	55.3	1.04	Kelton	56	4	35.3	2.72
Columbia Ex. Stat	78	25	53.5	1.02	Ogden (1)	54	18	39.5	6.59
Conway	79	30	55.7	0.00	Promontory	56	0	33.9	0.93
Evergreen	75	18	53.3	0.67	Terrace	55	0	34.2	1.80
Timmonsville	74	36	60.1	0.90	<i>Vermont.</i>				
Trials	79	25	50.6	0.25	Brattleborough (2)	62	5	31.9	
Winnborough	77	24	55.2	0.00	<i>British Columbia.</i>				
Walhalla	75	26	56.2	0.78	New Westminster	46	20	35.1	6.87
Yorkville	78	24	57.0	0.58	<i>Mexico.</i>				
<i>South Dakota.</i>					Masatlan	80	67	74.8	0.00
Parkston	66	2	32.2	1.25	<i>West Indies.</i>				
					Havana, Cuba	81	61	72.0	0.74
Reports received too late for publication in November.									
<i>Alabama.</i>					<i>Nebraska.</i>				
Opelika	78	40	56.2	4.09	Bingham	62	0	28.4	0.17
<i>Arizona.</i>					Crete	62	6	33.3	1.65
American Flag				0.80	Lincoln	60	6	34.9	1.03
American Ranch				0.18	<i>New Hampshire.</i>				
Ariz. Canal Co. Dam				0.08	Belmont				4.27
Calabasas				0.00	Bristol				5.03
Chiri Cahuas Mts				0.00	Lake Village				5.39
Chloride				0.19	Weir's Bridge				4.71
Crittenden				0.00	Wolfborough				6.57
Cottonwood				0.12	<i>New Mexico.</i>				
Copping Springs				0.11	Albuquerque	64	17	39.8	
Judleville				0.82	Antelope Springs				0.82
Eagle Pass		25	40.8	0.38	Cabezon				0.46
Hillette				0.00	Canon de Chama				1.45
Ilesa				0.75	Eddy				
Mount Huachuca	77	25	52.9	0.00	El Rito	88	18	47.9	
Pro				0.66	Embudio				1.60
How Low				0.65	Good Hope				0.33
Silver King				0.83	Jaquez				0.98
Saint John's				0.15	La Luz				1.50
Tempe				0.07	Monero	70	25	44.7	0.33
Willow Springs				1.15	Pojavace				0.30
Wood Canon				0.30	Polvadere Tract				0.27
<i>California.</i>					San Pedro				0.75
Anderson	81	31	54.1	5.38	Taos				2.00
Amampo	65	48	53.4	1.67	<i>New York.</i>				
Comis				3.06	Arcata				0.54
Endocino				3.45	Kingston	62	13		3.61
Gasadena				1.33	<i>North Carolina.</i>				
Santa Clara	78	30	56.4		Clarkton	85	20	52.6	4.55
Salnut Creek	74	35	54.7	2.40	Highlands	64	8	41.4	6.38
<i>Colorado.</i>					Pittsborough	74	27	51.1	4.30
Justed	60	2	30.5	0.33	<i>South Carolina.</i>				
Motoro				5.00	Belmont	77	23	53.0	5.00
Re Falls	46	9	27.2	1.50	Brewer Mine	78	21	53.3	5.58
<i>Georgia.</i>					Clinton	75	26	51.2	5.18
Andersonville	100	28	65.3	2.55	Columbia Ex. Sta.	80	23	52.5	3.83
Ardo Creek	73	18	46.6		Conway	82	26	56.5	3.01
<i>Illinois.</i>					Timmonsville	79	29	60.0	2.93
Annepin	60	5	36.2	1.86	Trials	81	23	52.9	4.90
Beida	58	0	36.6	3.20	Winnborough	81	20	53.7	5.81
<i>Indiana.</i>					Walhalla	69	26	50.8	5.33
Transport				3.81	Yorkville	80	20	54.2	4.76
<i>Iowa.</i>					<i>Texas.</i>				
Scatline (2)	57	7	36.7	1.65	Burnet	72	32		1.89
<i>Kanana.</i>					Cleburne	72	20	44.6	1.87
Arse	60	18	34.0	2.50	College Sta	85	32	57.0	6.06
Anna	58	28	40.3		Colorado	79	24	49.8	1.79
Alington	67	14	38.2	1.70	Dallas	75	26	49.0	2.54
<i>Maine.</i>					Durham				0.82
Diner	62	18	39.4	5.44	Fort Brown	83	37	64.2	0.60
<i>Mexico.</i>					Howe	84	22	47.3	3.29
Logia	86	52	65.9	0.04	Panster	76	31	48.0	3.82
<i>Minnesota.</i>					Santa Maria				1.35
Okston	52	7	25.1	0.42	Silver Falls	82	19	45.3	1.11
<i>Mississippi.</i>					<i>Virginia.</i>				
Lotoc	80	26	50.8	2.77	Abingdon				3.24
Omitti	78	28	50.8	2.81	<i>West Virginia.</i>				
<i>Missouri.</i>					Glenville				7.19
Abina				2.50	Hinton				2.17
<i>Montana.</i>					<i>Wisconsin.</i>				
Don	18	14	31.0	3.30	Wausau	56	0	27.4	0.67
<i>Nevada.</i>					<i>West Indies.</i>				
on City	71	12	38.2	2.47	Grand Turk Island	85	83	81.8	2.47



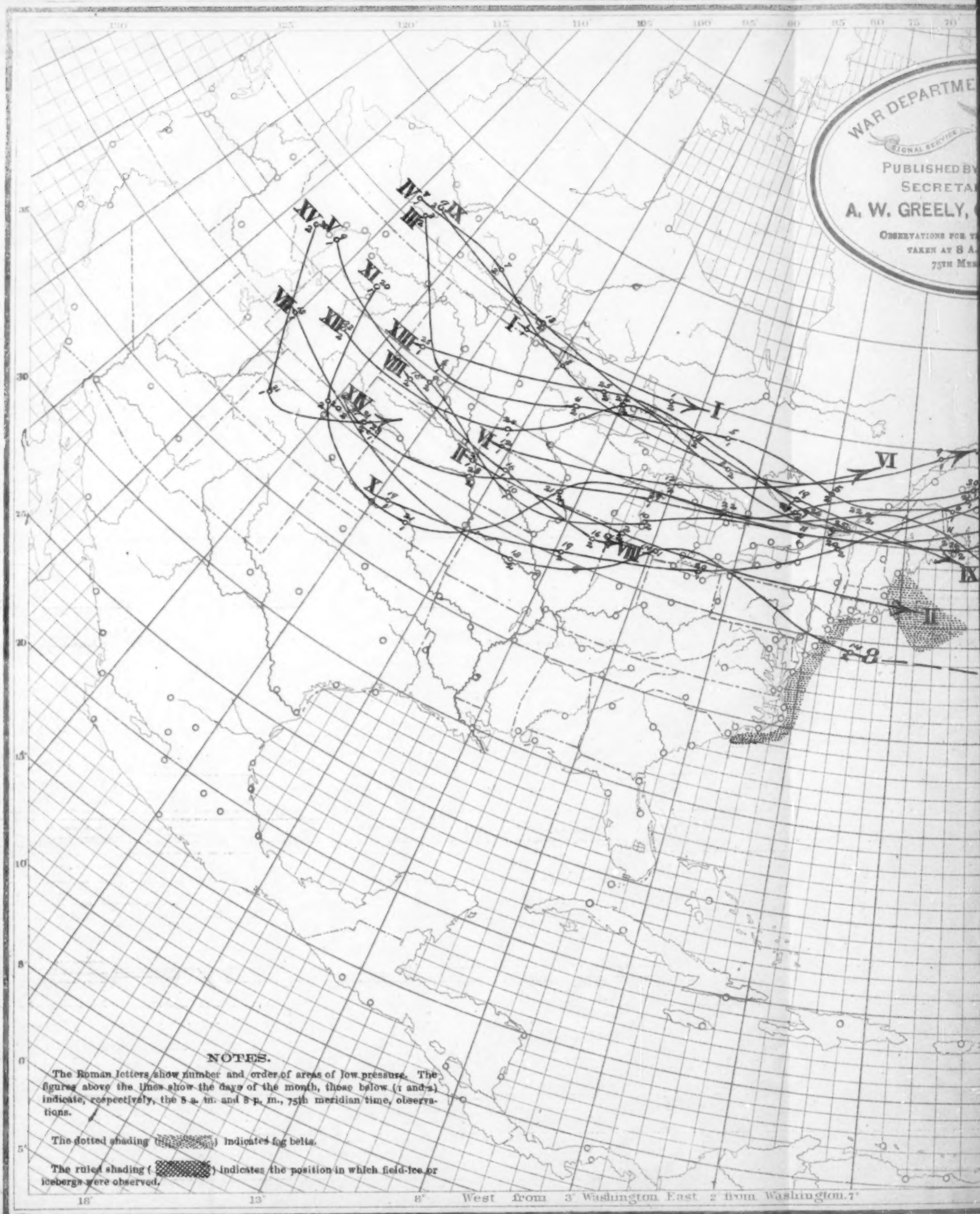
Table of miscellaneous meteorological data for December, 1889—Signal Service observations.

Stations and districts.	Elevation above sea level, feet.	Pressure, in inches.		Temperature of air, in degrees Fahrenheit.						Mean temperature of the dew-point.		Mean relative humidity, per cent.		Precipitation, in inches.		Departure from normal precipitation.		Wind.			Cloudless days.		Partly cloudy days.		Cloudy days.		Days with rainfall.		Average cloudiness, tenths.		Length of record, years.		Temperature data since opening of station.			
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Total movement, miles.	Prevailing direction.	Maximum velocity.		Date.	Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	8 a. m. Average cloudiness, tenths.	8 p. m. Average cloudiness, tenths.	Length of record, years.	Absolute maximum.	Year.	Absolute minimum.	Year.				
																			Miles per hour.	Direction.																
<b>New England.</b>																																				
Eastport	53	29.99	30.05	2.11	36.8	+5.5	49	35.2	1	21.6	40	6	19.6	71.0	4.56	+0.28	9,717	nw.	39	nw.	27	11	6	14	14	6.7	4.1	17	54	1877	-21	1884				
Portland	99	29.97	30.08	1.83	28.4	+2.4	60	39.0	4	25.1	31	3	23.7	75.6	4.96	+1.52	6,197	nw.	40	sw.	26	11	11	10	10	5.6	4.6	18	60	1889	-17	1872				
Manchester	247	29.84	30.12	1.68	32.0	+4.0	63	41.2	4	24.0	31	4	20.3	76.4	3.61	.....	4,493	nw.	33	sw.	26	12	9	10	10	5.3	4.3	3	63	1889	-3	1887				
Northfield	871	29.84	30.13	1.56	26.6	.....	55	35.4	12	17.9	35	4	20.0	78.7	2.61	.....	7,600	sw.	48	nw.	12	1	13	17	14	7.6	5.8	2	55	1886	-21	1883				
Boston	125	29.99	30.13	1.56	38.0	+6.0	55	45.1	10	30.8	30	5	27.3	69.1	2.66	+0.65	9,539	nw.	54	sw.	26	9	8	14	13	5.0	5.4	19	62	1887	-12	1888				
Nantucket	14	30.11	30.12	1.61	39.0	.....	54	45.7	24	32.2	25	3	37.0	83.5	2.07	.....	7,186	nw.	49	nw.	27	11	7	13	11	4.8	4.5	4	58	1887	-6	1875				
Wood's Holl	22	30.11	30.13	1.61	39.8	.....	54	45.4	21	34.2	24	5	34.7	83.6	2.06	+1.25	13,276	nw.	60	nw.	27	10	12	9	13	5.5	5.2	1	62	1889	-6	1888				
Vineyard Haven	26	30.12	30.15	1.53	43.2	+5.4	57	47.5	18	35.2	26	5	35.2	78.6	0.95	+3.31	14,394	nw.	60	ne.	14	7	15	9	12	4.9	4.7	10	59	1884	-3	1884				
Block Island	22	30.12	30.15	1.53	39.0	+6.0	57	47.5	14	35.2	26	5	35.2	78.6	0.95	+3.31	14,394	nw.	60	ne.	14	7	15	9	12	4.9	4.7	10	59	1884	-3	1884				
Narragansett Pier	107	30.04	30.16	1.41	38.8	+7.8	68	47.2	8	33.5	26	5	29.6	76.0	2.62	+0.05	6,229	nw.	41	nw.	26	8	13	10	17	5.4	5.3	18	60	1889	-10	1884				
New Haven	47	30.08	30.13	1.49	40.0	+7.0	59	46.6	13	33.3	25	6	31.2	73.7	1.90	+1.69	5,945	nw.	36	sw.	26	8	10	9	12	17	4.8	5.3	18	60	1879	-8	1883			
<b>Mid. Atlantic States.</b>																																				
Albany	85	30.06	30.16	1.39	35.0	+6.0	66	43.5	6	27.6	32	6	28.0	81.2	2.14	+0.71	5,921	sw.	48	sw.	26	8	13	10	13	5.0	4.0	1	66	1889	-17	1875				
New York City	185	29.97	30.17	1.34	41.4	+7.4	65	48.7	13	34.1	26	6	33.0	76.5	1.81	+1.50	8,834	sw.	48	sw.	26	8	13	10	13	5.0	4.0	1	66	1889	-11	1880				
Harrisburg	361	29.80	30.20	1.23	40.2	+6.0	68	47.7	14	32.6	26	5	32.3	76.9	2.11	.....	4,947	sw.	54	sw.	26	13	5	13	14	5.4	4.4	2	66	1889	-11	1880				
Philadelphia	117	30.07	30.19	1.27	43.6	+7.6	68	50.5	22	36.7	23	3	36.6	81.0	0.25	+3.86	8,608	sw.	48	sw.	26	12	9	11	10	5.3	4.4	1	70	1873	-7	1880				
Atlantic City	53	30.13	30.18	1.21	43.6	+7.6	73	54.1	23	37.9	30	3	33.8	69.8	0.61	+2.63	3,714	sw.	24	sw.	26	14	6	11	10	5.5	5.2	18	73	1889	-3	1880				
Baltimore	76	30.10	30.19	1.19	46.0	+9.0	73	54.9	22	36.3	34	6	33.8	72.4	0.19	+2.93	4,481	sw.	36	nw.	26	10	12	9	12	7.5	7.3	20	73	1873	-13	1880				
Washington City	112	30.08	30.20	1.16	45.6	+9.6	73	54.9	22	36.3	34	6	33.8	72.4	0.19	+2.93	4,481	sw.	36	nw.	26	10	12	9	12	7.5	7.3	20	73	1873	-13	1880				
Lynchburg	658	29.49	30.21	0.94	50.6	+11.6	74	60.3	28	42.6	28	5	40.0	73.6	0.77	+3.16	6,013	sw.	30	sw.	26	13	9	9	9	4.6	4.2	5	74	1889	-6	1880				
Norfolk	69	30.15	30.22	0.94	51.4	+8.4	74	60.3	28	42.6	28	5	40.0	73.6	0.77	+3.16	6,013	sw.	30	sw.	26	13	9	9	9	4.6	4.2	5	74	1889	-6	1880				
<b>S. Atlantic States.</b>																																				
Charlotte	808	29.38	30.24	0.65	54.7	+10.7	76	64.4	27	45.0	30	5	44.0	77.4	0.48	+4.64	3,424	sw.	20	sw.	26	18	7	6	6	3.3	3.2	12	76	1889	-5	1880				
Hatteras	11	30.22	30.24	0.79	54.6	+10.6	76	64.4	27	45.0	30	5	44.0	77.4	0.48	+4.64	3,424	sw.	20	sw.	26	18	7	6	6	3.3	3.2	12	76	1889	-5	1880				
Raleigh	375	29.82	30.23	0.77	53.4	+7.6	75	63.2	32	45.0	30	7	47.0	84.2	0.15	+3.53	3,854	sw.	22	sw.	29	15	13	3	3	1.3	1.4	17	78	1889	-13	1880				
Southport	52	30.18	30.24	0.68	56.0	+7.0	78	68.4	37	51.5	37	2	51.6	87.2	0.03	+3.79	4,323	sw.	24	ne.	31	24	5	2	2	1.3	1.4	17	78	1889	-13	1880				
Wilmington	52	30.18	30.24	0.68	56.0	+7.0	78	68.4	37	51.5	37	2	51.6	87.2	0.03	+3.79	4,323	sw.	24	ne.	31	24	5	2	2	1.3	1.4	17	78	1889	-13	1880				
Charleston	52	30.21	30.26	0.53	58.0	+9.0	77	69.7	26	45.2	38	2	47.8	85.8	0.55	+3.32	1,833	sw.	20	ne.	30	20	7	4	4	3.4	2.6	17	80	1875	-15	1880				
Columbia	183	30.09	30.28	0.57	57.4	+9.4	77	70.0	32	49.5	29	7	50.3	83.6	0.7	+3.74	4,146	sw.	22	n.	26	21	9	1	1	0.1	0.1	19	80	1875	-15	1880				
Augusta	87	30.18	30.25	0.50	59.8	+6.8	80	72.7	35	51.4	30	8	55.1	90.6	0.14	+2.47	3,016	n.	22	n.	31	20	9	2	2	0.1	0.1	19	81	1875	-19	1880				
Savannah	43	30.23	30.28	0.38	62.0	+2.0	80	72.7	35	51.4	30	8	55.1	90.6	0.14	+2.47	3,016	n.	22	n.	31	20	9	2	2	0.1	0.1	19	81	1875	-19	1880				
Jacksonville	43	30.23	30.28	0.38	62.0	+2.0	80	72.7	35	51.4	30	8	55.1	90.6	0.14	+2.47	3,016	n.	22	n.	31	20	9	2	2	0.1	0.1	19	81	1875	-19	1880				
<b>Florida Peninsula.</b>																																				
Cedar Keys	22	30.25	30.27	0.31	63.4	+5.4	77	70.3	41	56.6	25	6	58.0	90.5	0.36	+3.26	4,340	n.	20	ne.	31	17	11	3	3	0.3	0.4	3	78	1881	-22	1880				
Jupiter	28	30.20	30.23	0.20	70.5	+0.5	79	76.2	55	64.8	21	4	61.2	74.6	0.36	+3.26	4,340	n.	20	ne.	31	17	11	3	3	0.3	0.4	3	78	1881	-22	1880				
Key West	22	30.19	30.21	0.18	71.3	+0.3	79	74.0	40	56.0	29	5	66.2	83.6	0.28	+1.68	8,839	ne.	25	ne.	1	17	11	3	3	5.2	3.1	2	88	1876	-44	1876				
Mico	44	30.22	30.25	0.25	65.7	+0.7	78	73.1	48	54.3	27	12	57.8	88.5	0.03	+4.875	nw.	24	nw.	1	20	11	0	2	2	1.2	1.2	3	81	1887	-32	1888				
Titusville	44	30.22	30.25	0.25	65.7	+0.7	78	73.1	48	54.3	27	12	57.8	88.5	0.03	+4.875	nw.	24	nw.	1	20	11	0	2	2	1.2	1.2	3	81	1887	-32	1888				
<b>Eastern Gulf States.</b>																																				
Atlanta	1,139	29.05	30.20	0.46	57.2	+13.2	72	65.0	20	48.8	29	5	46.7	77.2	0.60	+4.77	5,556	sw.	26	sw.	31	13	11	7	7	3.4	1.2	12	72	1889	-1	1880				
Pensacola	50	30.19	30.25	0.44	57.2	+13.2	72	65.0	20	48.8	29	5	46.7	77.2	0.60	+4.77	5,556	sw.	26	sw.	31	13	11	7	7	3.4	1.2	12	72	1889	-1	1880				
Auburn	50	30.19	30.25	0.44	57.2	+13.2	72	65.0	20	48.8	29	5	46.7	77.2	0.60	+4.77	5,556	sw.	26	sw.	31	13	11	7	7	3.4	1.2	12	72	1889	-1	1880				
Mobile	35	30.23	30.27	0.49	61.0	+9.0	77	70.3	32	51.6	32	9	55.2	90.8	0.53	+4.20	4,002	sw.	26	sw.	21	12	13	6	6	2.7	1.6	16	79	1884	-14	1880				
Montgomery	217	30.02	30.25	0.50	59.1	+10.1	79	69.7	29	48.5	34	8	50.4	81.9	0.49	+4.77	2,184	sw.	24	ne.	31	19	6	6	3	2.9	1.6	16	79	1889	-8	1880				
Meridian	358	29.86	30.25	0.54	59.0	+10.0	76	70.2	22	47.9	39	9	50.9	87.1	2.09	.....	2,907	sw.	26	sw.	28	13	14	4	4	2.5	0.9	1	76	1889	-22	1880				
Vicksburg	222	29.97	30.21	0.62	63.6	+13.6	7																													

Table of miscellaneous meteorological data for December, 1889—Signal Service observations—Continued.

Stations and districts.	Elevation above level, feet.	Pressure, in inches.			Temperature of air, in degrees Fahrenheit.										Wind.			Clouds.			Precipitation.			Temperature data since opening of station.							
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Total movement, miles.	Prevailing direction.	Maximum velocity.		Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	8 a. m.	Average cloudiness, tenths.	Length of record, years.	Absolute maximum.	Year.	Absolute minimum.	Year.
																			Miles per hour.	Direction.											
Upper Miss. Valley.																															
Saint Paul	831	29.09	30.02	1.14	41.1	+14.0	47	34.8	-4	22.3	22	2	22.6	81.8	1.32	-0.05	5,622	se.	28	n.	29	7	10	14	9.6	4.8	17	58	1888	-39	1879
La Crosse	744	29.24	30.06	1.09	33.8	+11.6	61	41.0	7	26.6	25	2	26.2	78.6	1.95	-0.63	4,902	se.	40	nw.	29	7	14	10	14.6	5.5	18	61	1889	-37	1872
Davenport	615	29.41	30.08	1.02	39.6	+12.6	65	46.9	10	32.4	23	3	32.0	78.4	1.60	-0.17	5,403	nw.	36	nw.	29	10	9	12	15.4	9.5	12	65	1889	-22	1886
Des Moines	869	29.10	30.04	1.21	39.6	+15.6	69	48.2	8	30.9	31	6	29.5	75.4	0.57	-1.01	6,139	nw.	36	nw.	29	12	8	11	8.4	8.5	12	69	1889	-20	1886
Dubuque	631	29.33	30.06	1.09	37.4	+14.4	67	44.6	10	30.3	30	4	32.0	84.6	1.38	-0.54	3,908	se.	26	w.	22	5	13	13	13.5	9.5	4	67	1889	-24	1886
Keokuk	613	29.43	30.09	1.04	43.7	+14.7	69	50.5	10	34.9	25	3	36.0	81.6	1.08	-1.08	5,278	se.	36	w.	21	10	7	14	7.4	2.3	19	69	1889	-22	1872
Quincy	359	29.76	30.15	0.76	54.2	+17.2	74	62.4	26	40.0	28	4	43.6	72.7	0.77	-2.76	6,370	se.	36	s.	24	8	9	14	7.2	2.4	18	74	1889	-7	1872
Springfield, Ill.	644	29.40	30.10	0.93	44.4	+13.4	67	52.5	14	36.2	26	4	36.8	79.2	2.00	-0.90	7,354	se.	42	w.	29	10	10	11	7.6	4.4	11	67	1889	-14	1880
Saint Louis	571	29.31	30.13	0.90	44.8	+14.8	73	57.9	20	41.6	26	3	40.8	75.2	1.03	-1.44	7,580	se.	39	w.	29	11	12	8	6.4	6.3	7	74	1875	-17	1872
Missouri Valley.																															
Columbia	497	29.06	30.10	1.17	46.4	+11.4	70	54.7	12	38.2	29	2	37.9	77.8	0.14	-0.14	6,945	se.	36	se.	28	9	10	12	14.8	4.5	3	75	1889	-11	1889
Kansas City	947	29.06	30.10	1.17	46.4	+11.4	70	54.7	12	38.2	29	2	37.9	77.8	0.14	-0.14	6,945	se.	36	se.	28	9	10	12	14.8	4.5	3	75	1889	-11	1889
Springfield, Mo.	1,336	28.66	30.10	0.90	51.8	+14.8	74	61.3	13	42.4	31	6	42.3	79.1	1.05	-0.95	8,406	se.	36	se.	21	9	13	7	7.2	0.3	9	74	1889	-5	1887
Leavenworth	842	29.17	30.08	1.25	45.3	+14.3	73	54.3	11	36.1	34	3	34.9	76.7	0.68	-1.58	4,995	se.	36	se.	28	9	11	11	5.5	4.3	5	74	1889	-14	1880
Topeka	1,113	28.85	30.06	1.30	45.1	+15.1	74	57.8	4	32.4	43	7	32.0	76.4	0.55	-0.55	6,440	se.	42	nw.	29	7	10	14	5.5	8.5	1	74	1889	-9	1887
Omaha	1,113	28.85	30.06	1.30	45.1	+15.1	74	57.8	4	32.4	43	7	32.0	76.4	0.55	-0.55	6,440	se.	42	nw.	29	7	10	14	5.5	8.5	1	74	1889	-9	1887
Cretaceous	2,613	27.23	30.05	0.88	35.0	+0.0	66	47.8	-5	23.3	44	6	18.6	58.6	0.84	+0.58	6,834	se.	48	se.	22	13	11	7	4.3	5.3	4	68	1889	-15	1887
Valentine	1,158	28.74	30.04	1.24	35.2	+0.2	62	44.1	-5	26.3	34	5	24.4	72.2	1.14	-0.14	8,013	se.	48	nw.	29	7	11	13	6.5	0.4	5	62	1889	-5	1889
Sioux City	1,600	28.25	30.01	1.02	27.6	+7.6	53	37.6	-6	17.5	38	5	18.0	75.9	0.36	-0.13	5,214	nw.	42	nw.	28	13	10	8	6.4	1.4	4	67	1888	-30	1884
Fort Sully	1,307	28.57	30.01	1.02	28.4	+9.4	55	37.3	-12	15.2	50	5	15.4	69.4	1.53	-0.93	7,612	se.	44	nw.	29	12	8	11	6.4	4.3	9	63	1888	-34	1884
Huron	1,234	28.66	30.01	1.09	34.4	+14.4	60	44.2	3	24.6	38	5	24.2	78.7	1.37	+0.57	5,547	se.	45	n.	29	7	10	14	4.5	6.4	7	65	1888	-34	1879
Northern Slope.																															
Ft. Assiniboine	2,690	27.03	29.95	0.81	18.4	+0.4	50	27.0	-16	9.8	39	8	11.2	77.8	0.38	-0.32	8,918	se.	40	w.	14	11	15	5	6.5	1.4	7	68	1885	-50	1884
Fort Custer	3,040	26.71	29.95	0.76	27.9	+5.9	58	39.4	-4	16.4	38	6	21.2	86.8	0.25	-0.58	4,066	se.	26	se.	25	10	15	6	5.4	5.4	2	71	1885	-48	1884
Fort Maginnis	3,040	26.71	29.95	0.76	27.9	+5.9	58	39.4	-4	16.4	38	6	21.2	86.8	0.25	-0.58	4,066	se.	26	se.	25	10	15	6	5.4	5.4	2	71	1885	-48	1884
Helena	4,069	25.70	29.97	0.66	22.6	+1.4	47	30.2	-9	14.9	31	4	13.8	75.3	0.18	-0.97	2,401	nw.	24	se.	18	17	13	2	4.3	1.5	0	57	1885	-40	1880
Rapid City	3,280	26.32	29.97	0.71	35.3	+0.3	61	47.1	-3	23.4	44	5	19.4	62.0	0.33	-0.09	5,438	nw.	47	se.	24	12	11	8	7.4	5.4	4	68	1885	-25	1882
Cheyenne	6,105	23.93	30.00	0.68	35.5	+8.5	60	47.1	6	25.9	37	8	15.6	50.6	0.16	-0.06	7,296	w.	48	w.	2	8	9	14	4.3	5.3	5	64	1885	-24	1879
Fort McKinney	5,000	24.82	29.96	0.60	35.4	+0.4	59	47.9	3	22.9	49	10	23.9	73.7	0.02	-0.02	6,902	w.	60	se.	24	12	14	5	13.6	4.4	1	68	1885	-15	1887
Fort Washakie	5,580	24.34	30.01	0.70	30.5	+0.5	53	40.8	-8	20.2	31	10	16.2	64.8	0.62	-0.62	3,929	w.	30	se.	10	19	10	2	4.2	3.2	3	53	1889	-27	1882
North Platte	2,841	27.04	30.05	0.88	37.2	+0.2	70	51.0	8	23.4	49	8	21.4	66.0	0.54	-0.15	5,327	w.	48	nw.	28	8	21	2	2.4	3.3	3	70	1889	-27	1879
Middle Slope.																															
Colorado Springs	4,080	26.00	29.99	0.73	40.5	+7.5	66	52.5	4	28.5	42	8	22.1	56.0	0.30	-0.37	4,670	se.	38	nw.	10	8	18	5	3.3	6.2	1	74	1885	-25	1876
Denver	5,281	24.69	29.99	0.73	40.5	+7.5	66	52.5	4	28.5	42	8	22.1	56.0	0.30	-0.37	4,670	se.	38	nw.	10	8	18	5	3.3	6.2	1	74	1885	-25	1876
Pueblo	4,733	25.20	29.99	0.71	40.3	+7.3	68	56.1	6	28.5	42	8	22.1	56.0	0.30	-0.37	4,670	se.	38	nw.	10	8	18	5	3.3	6.2	1	74	1885	-25	1876
Concordia	4,110	25.24	29.99	0.71	40.3	+7.3	68	56.1	6	28.5	42	8	22.1	56.0	0.30	-0.37	4,670	se.	38	nw.	10	8	18	5	3.3	6.2	1	74	1885	-25	1876
Dodge City	2,523	27.39	30.07	0.92	44.6	+13.6	72	56.9	10	32.3	37	10	30.6	63.2	0.00	-0.71	8,148	se.	60	se.	28	18	9	4	0.3	5.3	9	73	1885	-15	1876
Wichita	1,366	28.60	30.09	1.14	45.4	+10.4	73	57.5	10	35.4	38	4	35.4	75.8	0.03	-0.03	6,571	se.	45	se.	28	14	10	7	3.3	3.3	5	73	1889	-10	1889
Fort Reno	3,000	26.00	29.99	0.73	40.5	+7.5	66	52.5	4	28.5	42	8	22.1	56.0	0.30	-0.37	4,670	se.	38	nw.	10	8	18	5	3.3	6.2	1	74	1885	-25	1876
Fort Supply	2,690	27.03	29.95	0.81	18.4	+0.4	50	27.0	-16	9.8	39	8	11.2	77.8	0.38	-0.32	8,918	se.	40	w.	14	11	15	5	6.5	1.4	7	68	1885	-50	1884
Fort Elliott	3,040	26.71	29.95	0.76	27.9	+5.9	58	39.4	-4	16.4	38	6	21.2	86.8	0.25	-0.58	4,066	se.	26	se.	25	10	15	6	5.4	5.4	2	71	1885	-48	1884
Southern Slope.																															
Fort Sill	1,200	28.54	30.11	0.87	53.8	+13.8	77	66.2	21	41.3	40	7	41.5	78.2	0.21	-1.80	7,591	se.	48	se.	28	21	7	3	0.2	3.1	6	77	1885	-2	1886
Abilene	1,748	28.29	30.12	0.71	59.6	+13.6	78	69.1	24	50.1	33	6	47.4	73.0	0.04	-0.55	9,299	se.	42	se.	28	12	13	6	0.4	2.8	5	68	1885	-9	1886
Fort Stanton	6,150	24.03	30.04	0.65	43.7	+0.7	68	58.5	5	28.9	45	7	29.8																		
Southern Plateau.																															
El Paso	3,796	26.27	30.07	0.63	33.2	+7.2	76	68.5	19	37.8	43	11	36.0	41.2	0.00	-0.64	3,404	nw.	33	nw.											





Low Pressure. December, 1889.

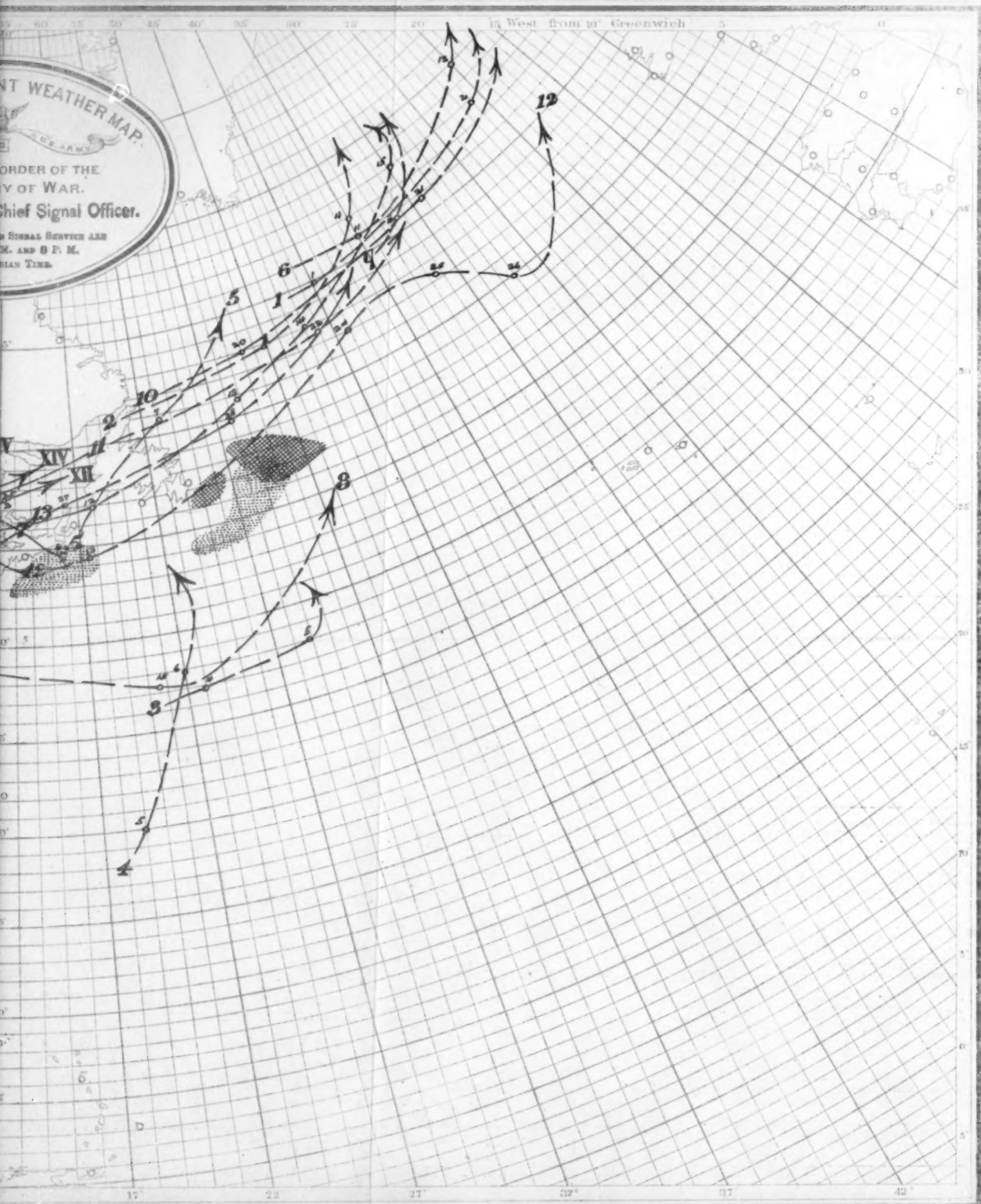










Chart III. Precipitation, December, 1889.

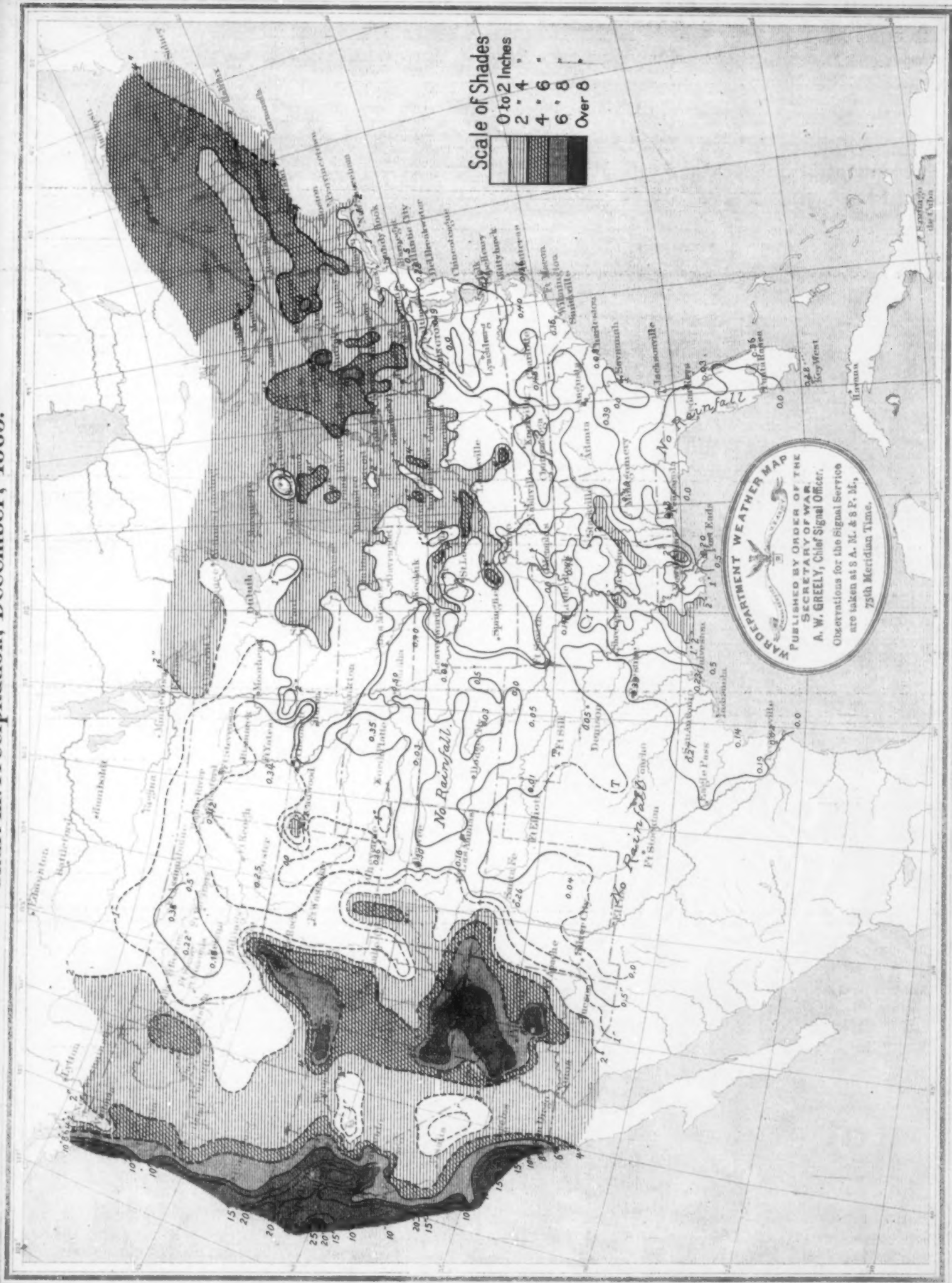
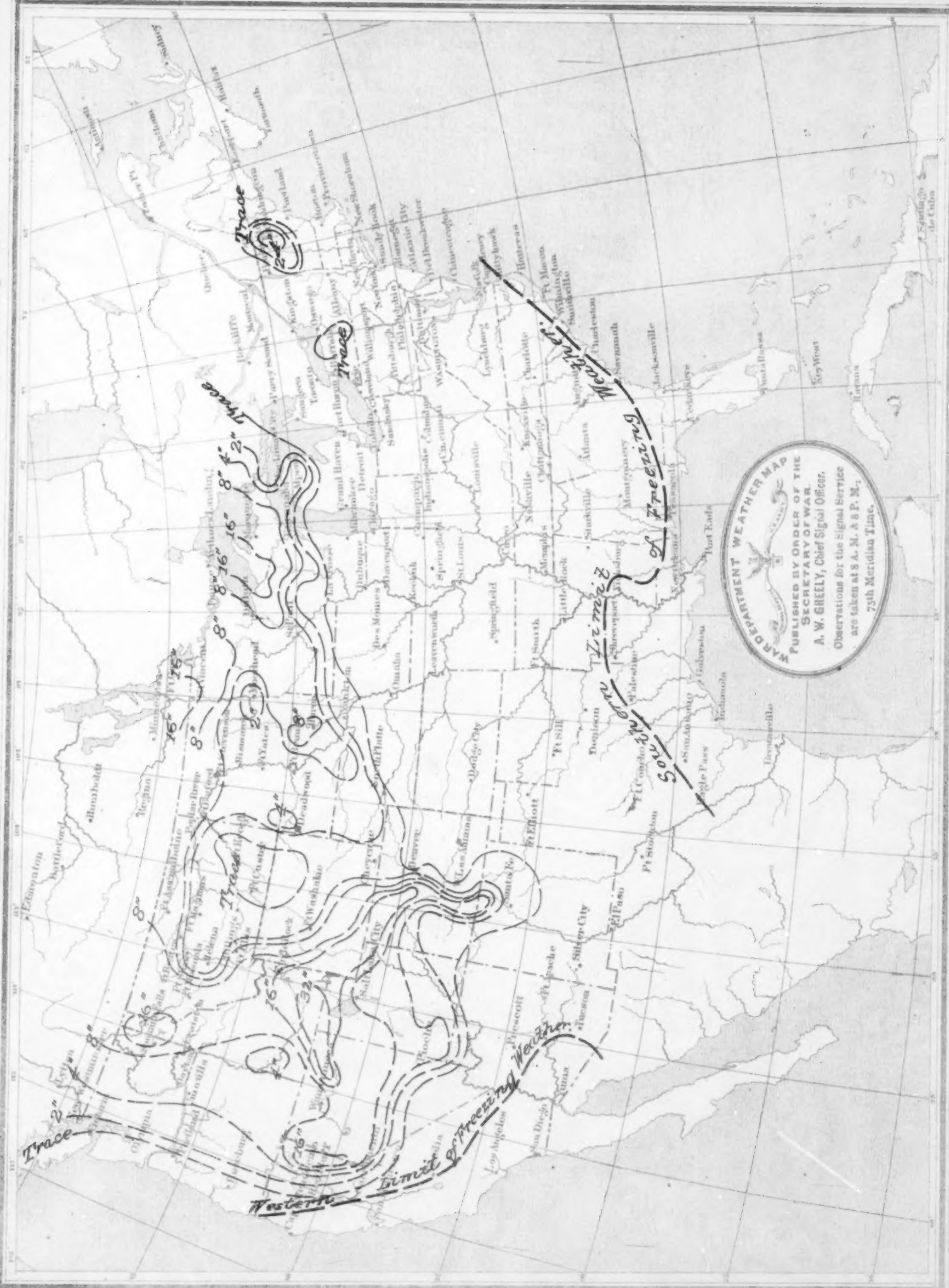






Chart IV. Depth of Snow (inches) reported on ground December 31, 1889, and Limits of Freezing Weather.







## ANNUAL SUMMARY FOR 1889.

The following general discussion of the weather over the United States during 1889 is based upon seven charts, published herewith, which show, respectively, the annual mean temperature and the departures from the normal temperature; the annual mean atmospheric pressure and the prevailing winds; the absolute ranges of temperature; the maximum temperatures; the minimum temperatures; the annual precipitation; and the departures of the annual precipitation from the annual normal precipitation. These charts have been prepared from data received from about 1,000 regular and voluntary observers of the Signal Service. An index of the MONTHLY WEATHER REVIEW for 1889 is also published herewith.

## TEMPERATURE.

The annual mean temperature was highest in adjoining parts of southeastern California and southwestern Arizona, and in extreme southern Florida, where it rose above 75°; and in the southern half of Florida, at Port Eads, La., in the lower Rio Grande valley, and in the lower Colorado and Gila valleys, mean readings of 70° or above were reported. The mean temperature was above 50° south of a line traced from southern New England irregularly westward to Denver, Colo., thence southward to central New Mexico, thence westward to central Arizona, and west of this line continued northwestward to extreme northeastern California, thence southeastward to central Utah, and thence northwestward to extreme northwestern Washington. The annual mean temperature was lowest in Manitoba, where it fell below 35°, and the mean values were below 40° north of a line traced from the west-central coast of the Gulf of Saint Lawrence westward over Canada and extreme northern Michigan to central Minnesota, and thence west-northwest into the British Possessions north of Montana. The mean readings were also below 40° in an area occupying the more elevated part of west-central Colorado.

The most marked departures above the normal temperature occurred in western Minnesota, North Dakota, north-central Montana, in the British Possessions north of North Dakota and Montana, and on the southwest coast of the Gulf of Saint Lawrence, where they exceeded 3°, and the departures above the normal temperature were 2° or more in Nova Scotia and eastern New Brunswick, in central Pennsylvania, and along the northern border of the country from Minnesota and the eastern part of the Dakotas to northern Idaho. The departures below the normal temperature equalled or exceeded 1° on the coast of eastern Maine, on the immediate south Atlantic coast south of South Carolina, in the Florida Peninsula, at Mobile, Ala., and in central Texas; elsewhere the departures below the normal temperature were less than 1°.

At stations in New England, the middle Atlantic states, Arkansas, Texas, Iowa, the Dakotas, Minnesota, Montana, Colorado, and on the Pacific coast, the annual mean temperature was the highest ever reported. The following are some of the more notable departures of the mean temperature for the current year above the highest previous annual mean temperature: Boston, Mass., mean for 1889, 50°.7, 1°.3 above mean for 1880; New York City, mean for 1889, 53°.5, 0°.6 above mean for 1878; Fort Smith, Ark., mean for 1889, 61°.6, 0°.8 above mean for 1887; Saint Vincent, Minn., mean for 1889, 37°.3, 1°.8 above mean for 1881; Portland, Oregon, mean for 1889, 54°.8, 0°.5 above mean for 1885; San Francisco, Cal., mean for 1889, 57°.9, 0°.6 above mean for 1877; San Diego, Cal., mean for 1889, 62°.6, 0°.4 above mean for 1885.

The highest absolute maximum temperature reported by a regular station of the Signal Service was 117° at Yuma, Ariz., on July 3d, and the maximum temperature rose above 100° over a greater part of the plateau region south of the Columbia River, on the Pacific coast south of the fortieth parallel, save along the immediate coast line, and from eastern Montana and the Dakotas southward over the eastern slope of the Rocky Mountains to the Rio Grande Valley. East of the

ninety-seventh meridian maximum temperatures of 100° or above were not reported by regular observers of the Signal Service, and the maximum readings were above 95° in a narrow belt running from the Red River of the North Valley to the west Gulf states, in the Atlantic states from central Virginia to northern Florida, and in the interior of the east Gulf states. The lowest maximum temperatures were noted on the coast of northern California, and in extreme eastern Massachusetts, where they fell to or below 80°, and the maximum readings were below 85° on the coast of Washington, and at coast stations in southeastern New England.

At Salt Lake City, Utah, the absolute maximum temperature, 102°, was the highest ever reported at that station, the highest previous maximum temperature, 101°, being noted in 1875. The highest absolute temperature ever reported by a regular station of the Signal Service was 119° at Fort McDowell, Ariz., in 1887.

The lowest absolute minimum temperature reported by a regular station of the Signal Service was -43°, at Saint Vincent, Minn., on February 23d; the minimum values were below -30° from Minnesota northwestward over North Dakota and northeastern Montana, and in northern Vermont; they were below -10° north of a line traced from southern Maine south of west over the lower lake region, the upper Mississippi and middle Missouri valleys to southern South Dakota, thence southwest to south-central Colorado, thence northwest to eastern Idaho, and thence northward over western Montana, and in an area in north-central Nevada; and were below zero north of a line traced from southern New England south of west to central Arizona, and east of this line continued northwestward to northwestern Nevada, and thence northward to the British Possessions north of extreme western Montana. The only sections in which the minimum temperature was above 32° (the freezing point) were Florida south of the thirtieth parallel, the Texas coast south of Galveston, the California coast south of the fortieth parallel, and in extreme southern California and southwestern Arizona.

No unprecedentedly low minimum temperatures were reported for the current year. The lowest absolute minimum temperature ever reported by a regular station of the Signal Service was -63°, at Poplar River, Mont., in 1885.

The greatest yearly ranges in temperature occurred in the Valley of the Red River of the North, and thence westward to Montana, where they exceeded 130°; they exceeded 100° north of a line traced from the middle New England coast south of west to central Arizona, and east of this line continued west of north to western Nevada, and thence northward over eastern Oregon and western and northern Idaho. The least yearly ranges in temperature occurred over extreme southern Florida, where they were less than 40°; along the middle Pacific coast they were less than 50°; and in Florida south of the thirtieth parallel, on the immediate west Gulf coast, and along the entire immediate Pacific coast they were less than 60°.

## ATMOSPHERIC PRESSURE.

The annual mean pressure was highest within an area which covered the east Gulf states, eastern Tennessee, and extreme northern Florida, where the mean readings rose to, or above, 30.10, and was lowest in the lower Colorado valley, where the mean values fell below 29.90. From the region of high pressure over the eastern part of the country there was a gradual decrease in pressure northward to the lower Saint Lawrence Valley, where it fell below 29.95, and from the region of low pressure over the western part of the southern plateau region the mean pressure increased eastward to the Atlantic coast, northward to the British Possessions, and westward to the Pacific coast.

The annual mean pressure was generally above the normal in the interior of the country, and was below the normal on the Pacific coast and adjoining parts of the plateau region, in the

Gulf States, except along the immediate coast, and at Atlantic coast stations between southern New England and Georgia. The most marked departures above the normal pressure were noted on the west coast of the Gulf of Saint Lawrence, and over the central part of the middle plateau region, where they equalled, or exceeded, .05, and the greatest departures below the normal pressure occurred on the Pacific coast, where they varied from .02 to .04.

The distribution of monthly mean pressure is of interest when considered in connection with the movements of low pressure storms and monthly precipitation. It has been found that marked departures from the usual distribution of monthly mean pressure cause the low pressure storms of the month to assume abnormal paths. In 1889 this result was noticeable in August and December when the pressure over the southeastern states was more than .10 above the normal, and no low pressure storms traversed the country east of the Mississippi River and south of the Ohio River, and in April when the pressure averaged more than .10 above the normal over the Canadian Maritime Provinces, and a large proportion of the low pressure storms passed southeastward from the Lake region and advanced over the Atlantic Ocean south of Nova Scotia, the normal course of storms in the latter-named regions being east or north of east from the Lake region. The great excess in rainfall in sections of the middle Atlantic states during the spring and summer months may also be attributed to an abnormal distribution of pressure, as during those months the pressure was unusually high between the coast of the United States and the Azores, which condition caused an inflow of vapor-laden southeast winds from the ocean over the coast districts, and also caused the storms of the north Atlantic to assume abnormal northerly paths.

#### PRECIPITATION.

The heaviest yearly precipitation reported was one hundred and eleven inches, at Delta, Shasta Co., Cal., and the yearly precipitation exceeded seventy inches in areas in eastern and southeastern Pennsylvania, in southeastern Virginia, and at Neah Bay, Wash. Sixty inches, or more, of precipitation were reported over the eastern parts of the middle Atlantic states, in eastern North Carolina, on the immediate Pacific coast between the forty-third and forty-ninth parallels, in extreme northwestern California, and in eastern California between the thirty-eighth and thirty-ninth parallels. Within an area extending from north-central Nevada southward over Nevada, southeastern California, and southwestern Arizona the yearly precipitation was less than five inches, and it generally amounted to less than twenty inches in the Rocky Mountain and plateau regions, except in areas in northwestern Wyoming, northeastern Nevada, southwestern Colorado, and from central Arizona northward over adjoining parts of southwestern Utah and eastern Nevada, where it varied from twenty to nearly thirty inches.

The greatest excesses in precipitation for the year occurred over eastern and central Virginia and thence northward over the District of Columbia, central Maryland, and south-central Pennsylvania, where the average annual precipitation was exceeded by more than seventeen inches. The yearly precipitation was generally above the normal in the Atlantic states, except along the greater part of the immediate coast and in Florida; it was also above the normal on the Pacific coast south of the forty-first parallel, and within an area extending from the south Pacific coast northeastward over southern Nevada, western and northern Arizona, Utah, thence eastward to Nebraska and Kansas, and thence southward over central Texas. On the Pacific coast the greatest excesses in precipitation were noted along the California coast from San Francisco to Los Angeles, where the rainfall for the year was more than twelve inches greater than the annual average amount, and where at Los Angeles the excess for the year was nearly sixteen inches. In the central valleys the greatest excesses occurred in eastern Kansas, where they were more than eight

inches, and where at Topeka the excess over the annual average was more than ten inches.

At a number of the regular stations of the Signal Service in the middle Atlantic states the annual precipitation was the heaviest ever reported, and a comparison of the records of the several stations shows the following absolute excesses in precipitation for 1889. At New York City the total precipitation, 58.68, was 3.34 greater than that of 1884; at Baltimore, Md. the total amount, 62.35, was 10.24 greater than that of 1886; at Washington City the total precipitation, 61.33, was 1.24 greater than that of 1878; at Lynchburgh, Va., the total precipitation, 60.58, was 3.30 greater than that of 1884; at Norfolk, Va., the total precipitation, 70.72, was 1.59 greater than that of 1877. On the extreme north Pacific coast the yearly precipitation is generally heavier than in any other section of the country, and at Neah Bay, Wash., where the annual precipitation averages 101.51, and amounted to 123.23 in 1886, the total rainfall for 1889 was but 79.83. At Tatoosh Island, Wash., where the annual average precipitation is 92.39, and where, in 1886, 112.47 fell, the rainfall for 1889 was 67.95. At Delta, Cal., where one hundred and eleven inches were reported for 1889, the yearly average rainfall is 44.23, and the greatest previous yearly precipitation, 53.54, was reported in 1885. On the middle and south Pacific coast the heaviest yearly precipitation occurred in 1884, when the precipitation of the current year was exceeded by amounts varying from 1.88 at San Francisco, Cal., to 11.56 at San Diego, Cal. In other sections of the country the years of occurrence of the heaviest precipitation varied. In New England the heaviest annual precipitation, 65.53, was reported at Boston, Mass., in 1878; in the middle Atlantic states the heaviest precipitation reported previous to the current year was 69.13, at Norfolk, Va., in 1877; in the south Atlantic states 102.4 fell at Hatteras, N. C., in 1877; in the Gulf states 90.97 fell at Mobile, Ala., in 1881; in the Ohio valley and Tennessee 73.87 fell at Knoxville, Tenn., in 1875; in the Lake region 60.24 fell at Buffalo, N. Y., in 1878; in the upper Mississippi valley 61.58 fell at Cairo, Ill., in 1882; in the Missouri Valley 52.06 fell at Leavenworth, Kans., in 1877; in the extreme northwest 34.01 fell at Moorhead, Minn., in 1882; in the Rocky Mountain and plateau regions, 25.67 at Fort Assinniboine, Mont., in 1884; 23.64 at Salt Lake City, Utah, in 1875; 33.55 at Dodge City, Kans., in 1881; and 48.45 at Fort Sill, Tex., in 1877. At Red Bluff, Cal., the heaviest yearly precipitation, 48.96, occurred in 1878; at Sacramento, Cal., 34.92, in 1884; at San Francisco, Cal., 38.82, in 1884; at Los Angeles, Cal., 40.39, in 1884; at San Diego, Cal., 27.59, in 1884; and at Yuma, Ariz., 5.86, in 1884.

The greatest deficiencies in annual precipitation occurred in east-central Louisiana and west-central Washington, where the total precipitation was twenty inches, or more, less than the usual yearly amount. The precipitation for the year was also below the normal from the Pacific coast north of the forty-second parallel eastward to the upper lake region, and thence southward over the Mississippi Valley to the Gulf of Mexico; in Nevada, New Mexico, eastern Arizona, along the entire coast of the Gulf of Mexico, and at a majority of coast stations from New Brunswick to Florida. The greatest deficiency noted on the Atlantic coast was 15.39 inches at Block Island, R. I. Chart vii, in showing the departures of the annual precipitation from the annual average precipitation, indicates the remarkable distribution of rainfall for the year. It will be seen that while the annual precipitation in the middle Atlantic states averaged about one-fourth greater than the average yearly amount of precipitation in that region, deficiencies occurred at middle Atlantic coast stations, and that but about 70 per cent. of the yearly average rainfall was reported at Block Island, R. I. On the south Pacific coast the precipitation was about two-thirds greater, and on the middle Pacific coast about one-third greater than usual, while on the north Pacific coast but about four-fifths of the annual average rainfall fell. In the west Gulf states there was an average deficiency of about 20 per cent., while within a limited



area about San Antonio, Tex., the yearly rainfall was about 25 per cent. greater than the annual average amount.

At stations in extreme eastern New England, northeastern Florida, the east Gulf states, the Ohio Valley and Tennessee, the upper and lower lake region, the upper Mississippi valley, the Missouri Valley, the extreme northwest, the northeastern slope of the Rocky Mountains, the southern plateau region, and on the north Pacific coast, the precipitation for 1889 was the least reported during the periods of observation. The smallest amount of annual precipitation ever reported by a regular station of the Signal Service was 0.74, at Yuma, Ariz., in 1880. The following are some of the more notable deficiencies in precipitation for 1889 as compared with the least yearly precipitation of preceding years: Eastport, Me., total for 1889, 42.46, 0.18 less than in 1880; Mobile, Ala., total for 1889, 49.88, 2.12 less than in 1887; Chattanooga, Tenn., total for 1889, 49.32, 1.76 less than in 1887; Toledo, Ohio, total for 1889, 21.84, 3.99 less than in 1874; Saint Paul, Minn., total for 1889, 16.96, 5.82 less than in 1878; Helena, Mont., total for 1889, 6.71, 3.43 less than in 1888; Tatoosh Island, Wash., total for 1889, 67.95, 7.23 less than in 1884.

The following are among the more notable meteorological features of the year:

In March the rainfall was very heavy on the middle and south Pacific coasts, where more than double the usual amount for the month fell.

In April there was a large excess of rainfall in the Rio Grande Valley and in the middle Atlantic states, and a marked deficiency in rainfall on the south Pacific coast.

In May the rainfall on the middle Pacific coast was about two and one-half times greater than the average for the month, and in the middle Atlantic states the rainfall was about one-half greater than usual. The exceptionally heavy rains in the middle Atlantic states, more especially those which fell during the last two days of the month, caused destructive floods, while great deficiencies in rainfall were noted in sections of the Southern States, where damaging drought was reported.

In June the precipitation was excessive over the eastern part of the country, and destructive floods occurred in sections of the Middle States at the beginning of the month, while in Dakota, Montana, and Idaho less than one-half of the usual amount of precipitation fell, and severe droughts were experienced.

In July damaging drought prevailed in Nevada, southern California, Utah, and Montana.

In August the precipitation was heavy in areas in the Atlantic coast states; the monthly rainfall was the least ever reported for August in parts of the Ohio Valley and Michigan, and damaging drought prevailed in parts of the Ohio Valley, Texas, Utah, and in the north-central states and territories. Killing frost was reported at Galena, Ill., and snow fell on the 15th at Greensburgh, Pa.

In September frost occurred in the northern part of the Southern States, its occurrence being seasonable. The rainfall was very unequally distributed east of the Rocky Mountains, large excesses and marked deficiencies occurring in contiguous states and at neighboring stations. Navigation was closed on the upper Mississippi River by low water.

In October killing frost occurred in North Carolina, South Carolina, northern Mississippi, and Tennessee, its occurrence being one to two weeks earlier than usual. Very heavy rain fell on the middle and south Pacific coasts, the precipitation for the month being the heaviest ever reported in those districts for October. Navigation was interrupted or suspended on the upper Mississippi and upper Tennessee rivers by low water, and damaging drought occurred in some of the southern and central states.

In November killing frost occurred in Alabama, its occurrence being about ten days later than usual, and light frost was reported as far south as Brownsville, Tex., and Los Angeles, Cal. Navigation was interrupted or suspended by ice on the upper Mississippi River above Keokuk, Iowa, and on the middle and upper Missouri River.

In December the temperature was above the normal, except on the Pacific coast and over the western part of the plateau region, and east of the Rocky Mountains, and in the middle and southern plateau regions it was generally the warmest December on record. The precipitation was the least ever reported for December in the central and southeastern states, while at Los Angeles, Cal., the monthly rainfall was the greatest ever noted for December. The Central Pacific Railroad crossing the summit of the Sierra Nevada Mountains was blockaded several days by snow. Destructive floods occurred in California, Arizona, and southern Nevada.

#### FOG IN 1889.

The following table shows the number of days in each month for which fog was reported on the north Atlantic Ocean along, or near, the trans-Atlantic steamship routes, west of the fortieth meridian, in 1889:

Month.	Between W. 40° and 55°.	Between W. 55° and 65°.	West of 65°.	Month.	Between W. 40° and 55°.	Between W. 55° and 65°.	West of 65°.
January.....	5	10	5	August.....	22	6	9
February.....	13	4	3	September.....	19	6	8
March.....	17	12	7	October.....	19	6	8
April.....	19	18	16	November.....	15	4	4
May.....	15	15	20	December.....	4	4	3
June.....	19	18	15				
July.....	18	10	11	Totals.....	185	113	109

From the above it will be seen that in the vicinity of the Banks of Newfoundland fog occurred most frequently from April to October, the greatest number of foggy days for any month, twenty-two, being noted in August, and that in January and December the foggy days numbered but five and four, respectively. Between the fifty-fifth and sixty-fifth meridians fog occurred most frequently in the spring and early summer months, the greatest number of foggy days, eighteen, being noted in April and June, and the least number, four, in February, November, and December. West of the sixty-fifth meridian the months of greatest fog-frequency were April, May, and June, the greatest number of foggy days, twenty, being noted in June, while during the winter months the foggy days diminished in number to three in February and December. In the preceding year fog was reported most frequently in the vicinity of the Grand Banks in July, when it was noted for twenty-eight days, from which month there was a gradual decrease in fog-frequency until December; for that year the period of greatest fog-frequency between the fifty-fifth and sixty-fifth meridians corresponded with that of the Grand Banks, although the aggregate number of foggy days for the year was more than fifty per cent. less, while to the westward of the sixty-fifth meridian the greatest number of foggy days, twenty-one, was noted in May, from which month there was a gradual decrease in the number of foggy days until December. Reports show that the current year had a less number of foggy days near the Grand Banks and west of the sixty-fifth meridian, fourteen and fifteen, respectively, and a greater number, eighteen, between the fifty-fifth and sixty-fifth meridians, than were noted for the preceding year. As has been stated in each succeeding issue of the MONTHLY WEATHER REVIEW since 1886, the development of fog along the trans-Atlantic steamship routes west of the fortieth meridian bears a definite relation to the low pressure storms which advance eastward from the American continent. The fogs of the Grand Banks are found to develop in the eastern quadrants of low pressure storms, and are apparently due to the precipitation of the aqueous vapor contained in the warm air from over the Gulf Stream which is drawn over the cold surface of the Arctic current and ice fields by the southerly winds which prevail to the eastward of low pressure storms. To the westward of the fifty-fifth meridian the development of fog generally attends the approach or passage to the northward of low pressure storms, which cause an inflow of warm, moist

air from the Gulf Stream over the cold surface of the Arctic current which flows along the coast, and whose deep-flowing, colder waters are forced to the surface by Sable Island Bank and George's and Nantucket shoals, and where fog is generally found to attend or follow rain and to precede clearing weather.

Annual summary for 1889—Signal Service stations.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.		
	Mean annual.	Departure from normal.	Extremes for 1889.				Total 1889.	Departure from normal.	Percentage of normal.
			Max.	Date of max.	Min.	Date of min.			
<i>Alabama.</i>	°	°	°		°		Inches.	Inches.	
Mobile.....	66.4	-1.1	95	July 23	29	Feb. 7	49.88	-15.03	77
Montgomery.....	65.3	-0.6	99	July 24	21	Feb. 7	45.62	-8.15	85
<i>Arizona.</i>									
Fort Grant.....	61.6	+0.9	100	July 2	20	Jan. 20	13.32	+3.45	79
Whipple Barracks.....	53.1	+0.6	100	July 3	-8	Jan. 20	20.83	+4.74	130
Yuma.....	73.0	+1.1	117	July 3	34	Feb. 18	4.69	+1.77	101
<i>Arkansas.</i>									
Fort Smith.....	61.6	+1.0	98	Aug. 14	13	Jan. 28	43.20	+0.89	102
Little Rock.....	61.8	-0.6	95	July 17	17	Feb. 24	54.21	+0.74	101
<i>California.</i>									
Colo. Springs.....	48.4	.....	96	July 6	-8	Feb. 20	13.77	-0.57	96
Denver.....	50.0	+0.2	100	July 31	-7	Feb. 17	14.75	+0.17	101
Montrose.....	49.7	-0.1	96	July 31	-6	Jan. 30	7.20	.....	.....
Pueblo.....	52.3	.....	102	July 31	-11	Jan. 15	10.50	.....	.....
<i>Connecticut.</i>									
New Haven.....	50.6	+1.6	91	May 10	-3	Feb. 24	59.78	+10.08	130
New London.....	51.3	+1.9	86	July 8	-1	Feb. 24	49.70	+0.61	101
<i>Florida.</i>									
Eureka.....	52.8	.....	77	Sept. 25	28	Feb. 17	18.70	.....	.....
Fresno.....	64.3	.....	112	July 4	27	Feb. 18	12.27	.....	.....
Keeler.....	62.3	+1.4	107	July 29	21	Feb. 17	3.00	.....	.....
Los Angeles.....	63.0	+0.8	103	Sept. 16	32	Jan. 19	33.31	+15.77	190
Red Bluff.....	63.2	+1.1	103	July 30	26	Feb. 15	32.87	+7.14	128
Sacramento.....	60.9	+0.9	104	July 30	31	.....	27.48	+6.05	128
San Diego.....	62.6	+1.8	91	Sept. 25	36	Jan. 21	16.03	+5.18	148
San Francisco.....	57.9	+1.2	89	Sept. 24	39	Feb. 17	36.94	+13.45	157
<i>District of Columbia.</i>									
Washington City.....	55.1	+0.4	93	May 9	4	Feb. 24	61.33	+17.42	140
<i>Georgia.</i>									
Cedar Keys.....	69.0	-1.4	91	Sept. 15	34	Nov. 30	43.37	-10.79	80
Jacksonville.....	68.4	-1.5	97	July 23, 24	30	Nov. 30	46.22	-10.70	81
Key West.....	75.0	-1.9	89	.....	54	Jan. 29	52.67	+13.50	134
Pensacola.....	68.3	+0.2	94	July 18	29	Feb. 7	52.74	+12.12	81
<i>Idaho.</i>									
Atlanta.....	61.1	0.0	95	July 24	14	Feb. 7	54.75	+1.32	98
Augusta.....	64.5	-0.5	100	July 11	20	Feb. 7	49.25	+0.61	101
Savannah.....	65.6	-1.5	96	May 11	24	Feb. 7	47.55	-5.01	90
<i>Illinois.</i>									
Boise City.....	52.2	+1.6	102	July 29	2	Jan. 2	10.95	-2.52	81
Cairo.....	57.8	+0.1	91	July 13	6	Feb. 23	37.74	-6.16	86
Chicago.....	48.8	-0.1	90	July 9	-11	Feb. 23	34.95	-1.29	86
Springfield.....	52.2	-0.9	91	July 13	-5	Feb. 23	33.31	-8.23	80
<i>Indiana.</i>									
Indianapolis.....	53.1	+0.8	92	July 2	-1	Feb. 23	38.41	-6.59	85
<i>Iowa.</i>									
Davenport.....	49.9	+0.6	92	Aug. 29	-12	Feb. 23	37.61	+2.38	107
Des Moines.....	49.9	+0.5	93	Aug. 29	-13	Feb. 23	35.90	-11.60	69
Dubuque.....	48.7	+1.3	95	July 18	-16	Feb. 23	24.25	-13.93	64
Keokuk.....	51.9	+0.4	93	Aug. 29	-8	Feb. 23	34.75	-1.88	95
<i>Kansas.</i>									
Concordia.....	52.8	+1.3	97	July 17	-7	Feb. 23	34.47	.....	.....
Dodge City.....	54.3	+1.2	105	July 27	-8	Feb. 18	19.17	-1.75	91
Leavenworth.....	53.9	+0.4	93	July 21	-5	Feb. 23	40.93	+2.30	106
<i>Kentucky.</i>									
Lexington.....	55.0	.....	90	July 10	6	Feb. 6	41.50	.....	.....
Louisville.....	56.8	-0.5	93	June 20	6	Feb. 6	35.02	-12.65	73
<i>Louisiana.</i>									
New Orleans.....	68.8	-0.6	95	July 21	32	Feb. 7	48.45	-16.44	75
Shreveport.....	65.9	-0.5	90	July 27	25	Jan. 27	46.17	-6.37	88
<i>Maine.</i>									
Eastport.....	43.5	-1.9	83	Sept. 2	-12	Feb. 24	42.26	-8.38	83
Portland.....	46.4	-0.3	92	May 10	-8	Feb. 24	41.92	-0.23	99
<i>Maryland.</i>									
Baltimore.....	55.8	+0.2	93	May 10	3	Feb. 24	62.35	+19.19	144
<i>Massachusetts.</i>									
Boston.....	50.7	+1.9	91	May 10	-1	Feb. 24	39.82	-7.00	85
Nantucket.....	49.9	.....	80	Aug. 22	4	Feb. 24	57.99	.....	.....
Wood's Holl.....	49.8	.....	79	July 8	3	Feb. 24	46.11	+2.00	105
<i>Michigan.</i>									
Alpena.....	42.2	+1.5	91	May 18	-14	Feb. 24	31.32	-6.05	84
Detroit.....	48.7	-0.3	91	July 10	-8	Feb. 23	21.06	-12.25	63
Lansing.....	47.2	.....	93	Aug. 30	-11	Feb. 24	24.21	.....	.....
Marquette.....	41.6	+1.8	88	Aug. 28	-21	Feb. 23	30.31	-2.43	93
Port Huron.....	46.1	+1.3	91	July 9	-13	Feb. 24	22.22	-10.59	68
<i>Minnesota.</i>									
Duluth.....	40.9	+2.3	86	Aug. 29	-30	Feb. 23	32.04	-0.48	99
Moorehead.....	40.2	+3.2	96	Aug. 30	-35	Feb. 23	17.07	-8.54	67
Saint Paul.....	45.0	+1.0	96	July 7	-25	Feb. 23	16.96	-11.51	60
Saint Vincent.....	37.3	+3.9	95	Aug. 30	-43	Feb. 23	14.44	-2.43	86
<i>Mississippi.</i>									
Vicksburg.....	65.9	-0.1	94	Sept. 14	24	Feb. 7, 24	41.30	-17.45	70
<i>Missouri.</i>									
Saint Louis.....	56.0	-0.3	93	June 20	0	Feb. 23	33.16	-5.54	86
Springfield.....	55.6	.....	92	July 13, 18	1	Feb. 6	47.96	.....	.....

Annual summary for 1889—Signal Service stations.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.		
	Mean annual.	Departure from normal.	Extremes for 1889.				Total 1889.	Departure from normal.	Percentage of normal.
			Max.	Date of max.	Min.	Date of min.			
<i>Montana.</i>	°	°	°		°		<i>Inches.</i>	<i>Inches.</i>	
Fort Assiniboine ..	43.4	+3.1	99	Aug. 31	-22	Feb. 23	9.75	-6.57	60
Fort Maginnis .....	44.5	+3.4	92	Aug. 31	-28	Feb. 22	13.89	-3.34	81
Fort Custer .....	46.1	+1.1	100	June 27	-24	Feb. 17	7.48	-6.16	55
Helena .....	45.1	+2.1	93	Aug. 31	-15	Feb. 22	6.71	-7.18	48
<i>Nebraska.</i>									
North Platte .....	48.8	-0.1	102	July 5, 6	-9	Jan. 20	20.66	+1.55	108
Omaha .....	51.2	+1.6	94	July 6	-10	Feb. 23	22.97	-11.13	67
Valentine .....	48.8	.....	106	July 6	-15	Feb. 19	19.55	.....	.....
<i>Nevada.</i>									
Winnemucca .....	49.9	+0.2	102	July 29	-14	Jan. 19	5.75	-3.17	64
<i>New Hampshire.</i>									
Manchester .....	48.1	.....	94	May 9	-9	Feb. 24	36.94	.....	.....
<i>New Jersey.</i>									
Atlantic City .....	52.3	-0.1	89	May 10	2	Feb. 24	38.83	-3.92	91
<i>New Mexico.</i>									
Santa Fe .....	49.8	+1.4	90	July 27	-1	Feb. 18	7.89	-6.05	57
Fort Stanton .....	51.3	.....	92	July 28	5	Jan. 24 Dec. 30	14.49	-3.23	82
<i>New York.</i>									
Albany .....	50.0	+1.0	92	May 9	-5	Feb. 24	39.51	+1.37	104
Buffalo .....	47.1	-0.9	89	May 18	-10	Feb. 24	40.07	+2.31	106
New York City .....	53.5	+1.5	90	Aug. 21	2	Feb. 24	58.68	+14.31	132
Oswego .....	46.0	-0.4	90	May 18	-5	Feb. 4	40.10	+5.40	116
Rochester .....	47.3	+0.6	93	May 18	-9	Feb. 24	35.70	+0.92	103
<i>North Carolina.</i>									
Charlotte .....	60.6	+0.3	96	July 12	13	Feb. 7	50.28	-4.96	91
Hatteras .....	61.2	-0.2	87	July 11	22	Feb. 7	67.24	-2.76	91
Kitty Hawk .....	60.3	.....	95	July 11	13	Feb. 24	55.39	.....	.....
Raleigh .....	59.4	.....	97	May 11	20	Feb. 7	45.06 59.31	.....	.....
Southport .....	62.6	.....	97	May 11	20	Feb. 7	59.31	+1.95	103
<i>North Dakota.</i>									
Bismarck .....	42.7	+3.2	102	Aug. 27	-34	Feb. 23	11.03	-8.54	56
Fort Buford .....	41.4	+1.6	101	June 28	-32	Feb. 23	8.46	-5.91	59
<i>Ohio.</i>									
Cincinnati .....	54.8	-0.7	92	July Sept. 1	6	Feb. 23	30.92	-10.62	74
Cleveland .....	49.8	+1.2	92	July 10	-7	Feb. 24	32.57	-4.51	88
Columbus .....	52.2	0.0	92	July 10	1	Feb. 23	28.50	-11.91	71
Sandusky .....	49.9	-0.1	93	July 10	-5	Feb. 23	24.89	-11.52	68
Toledo .....	49.8	+0.1	91	July 9	-5	Feb. 23	21.84	-10.50	68
<i>Oregon.</i>									
Portland .....	54.8	+1.8	96	July 19	23	Feb. 16	31.76	-19.13	62
Roseburg .....	54.6	+1.7	97	July 19	22	Feb. 16	28.12	-6.77	81
<i>Pennsylvania.</i>									
Erie .....	48.7	-0.2	89	May 18	-10	Feb. 24	37.66	-4.74	89
Philadelphia .....	54.8	+0.7	94	July 9	2	Feb. 24	50.60	+9.97	125
Pittsburgh .....	53.4	+0.1	93	July 10	-1	Feb. 24	41.37	+4.05	111
<i>Rhode Island.</i>									
Black Island .....	49.8	+0.3	81	July 14	2	Feb. 24	32.80	-15.39	66
<i>South Carolina.</i>									
Charleston .....	65.6	-0.7	97	July 12	26	Feb. 7	52.15	-5.45	91
<i>South Dakota.</i>									
Fort Sully .....	46.5	.....	107	Aug. 27	-22	Feb. 23	15.29	-0.52	97
Huron .....	44.3	+1.3	104	July 6	-30	Feb. 6	20.17	-2.81	88
Yankton .....	48.6	+2.4	98	July 6	-18	Feb. 6	19.71	-8.13	71
<i>Tennessee.</i>									
Chattanooga .....	60.4	0.0	92	July 23	13	Feb. 7	49.31	-8.70	85
Knoxville .....	58.2	-0.2	92	July 10	12	Feb. 7	47.73	-5.95	89
Memphis .....	63.2	+0.6	94	July 17	17	Feb. 24	44.07	-9.17	83
Nashville .....	59.1	-0.2	93	July 24	12	Feb. 7	43.01	-10.00	81
<i>Texas.</i>									
Abilene .....	63.3	-1.3	100	Aug. 1	14	Feb. 24	25.23	.....	.....
Brownsville .....	73.0	+0.2	94	July 21	37 27, 28	Jan. 21, 27, 28	34.61	-2.42	93
Corpus Christi .....	69.9	-0.3	94	Aug. 9	34	Jan. 27	41.27	.....	.....
El Paso .....	64.1	+0.1	104	July 2	15	Feb. 18	7.10	-3.98	64
Galveston .....	69.3	-0.9	92	Aug. 16	32	Jan. 27	37.52	-14.99	71
Palestine .....	66.2	+0.6	99	July 27 Aug. 1	24	Feb. 24	46.43	+1.22	103
Rio Grande City .....	73.6	-0.7	106	Aug. 15	30	Jan. 21	22.64	-1.03	96
San Antonio .....	67.8	-0.7	98	July 27	28	Jan. 21	38.96	+7.33	123
<i>Utah.</i>									
Salt Lake City .....	53.7	+1.6	102	July 30	5	Jan. 3	18.46	+1.78	111
<i>Vermont.</i>									
Northfield .....	42.7	.....	90	May 18	-32	Feb. 4	36.66	.....	.....
<i>Virginia.</i>									
Lynchburg .....	57.2	-0.1	96	July 10	7	Feb. 24	60.58	+17.01	139
Norfolk .....	59.1	-0.4	98	July 11	16	Feb. 24	70.72	+19.35	136
<i>West Virginia.</i>									
Parkersburg .....	53.5	.....	94	July 10	4	Feb. 24	38.16	.....	.....
<i>Washington.</i>									
Fort Canby .....	51.9	+1.1	86	Sept. 17	30	Feb. 16	53.44	-7.21	88
Olympia .....	51.7	+1.9	90	June 2 July 9, 19	20	Feb. 16	33.73	-20.00	63
Port Angeles .....	47.6	+1.4	83	July 8	26	Jan. 14	27.58	-1.91	94
Walla Walla .....	54.3	.....	100	July 26	9	Dec. 29	14.53	-2.21	.....
<i>Wisconsin.</i>									
Green Bay .....	44.0	.....	90	Aug. 29	-24	Feb. 23	32.56	-1.46	.....
La Crosse .....	46.3	+0.3	92	July 7	-23	Feb. 23	24.37	-7.98	75
Milwaukee .....	46.1	+1.0	90	July 8	-16	Feb. 23	31.70	-1.11	97
<i>Wyoming.</i>									
Cheyenne .....	45.7	+0.8	95	July 5	-16	Feb. 17	14.65	+3.05	126



The following table contains all annual meteorological summaries for 1889, furnished by voluntary observers, and such other summaries of the reports of voluntary observers as could be prepared in this office in time for this publication:

## Annual summary for 1889—Voluntary stations.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
<b>Alabama.</b>	°	°	°		°		Inches.	Inches.
Auburn	63.5				16	Feb.	44.97	
Bermuda	61.8		94	July	20	Feb.	30.94	
Decatur							49.82	
Greensborough	64.7		94	June	20	Feb.	35.68	
Livingston	63.1		94	July	20	Feb.	39.38	
Mount Vernon Barracks.	65.9		100	July	22	Feb.	44.07	
Motes	62.7		92	June, July	11	Feb.	53.88	
Tusculum	60.1		92	July, Aug.	15	Feb.	43.78	
Uniontown	66.0		95	June	4	Feb.	40.28	
Valley Head	57.0		95	July	7	Feb.	50.32	
<b>Arizona.</b>								
Benson	67.6		102	July	24	Feb.	7.78	
Casa Grande	75.0		115	July	35	Jan.		
Fort Apache	55.0		102	July	5	Feb.	13.90	
Fort Bowie	61.2		101	July	14	Feb.	11.56	
Fort Huachuca	60.4		96	July	21	Feb.	15.39	
Fort Lowell			111	July	22	Feb.	16.92	
Fort McDowell	69.6		117	July, Aug.	25	Jan.	13.67	
Fort Mojave	70.6		120	July	28	Feb.	21.38	
Fort Verde	60.9		116	Aug.	14	Feb.	16.06	
Florence	68.6		111	July	25	Feb.		
Holbrook	57.1		100	July	7	Jan.	7.63	
Huachuca Mountains			109	Aug.	19	Jan.	15.87	
Maricopa	71.0		115	July, Aug.	37	Dec.		
Pantano	65.4		111	July	27	Jan.	15.50	
San Carlos							13.06	
Texas Hill	74.8		113	June	39	Feb.	3.54	
Teviston							12.00	
Tucson	68.3		105	July	29	Feb.	18.35	
Williams	45.6		91	June	0	Jan.		
Wilcox	65.9		105	July	25	Jan.		
<b>Arkansas.</b>								
Arkansas City							38.18	
Conway	60.6		94	July	19	Feb.	56.03	
Camden			94	July	23	Feb.	50.30	
Forrest City	63.4		95	June	19	Jan., Feb.	45.15	
Helena	57.5		98	July	15	Feb.	41.05	
Hot Springs			98	July	14	Feb.	50.79	
Lead Hill	59.8	+ 2.2	107	June	10	Feb.	45.76	-13.94
Little Rock Barracks	62.1		97	Aug.	17	Feb.	50.79	
Lonoke	63.0		97	July	19	Feb.	49.01	
Newport			98	July			50.94	
Ozone	57.9		91	July	9	Jan.	49.60	
Stuttgart	60.9		95	July	16	Feb.	40.74	
Texarkana	64.9		100	July	20	Jan.		
Washington	63.6		98	July	20	Feb.	47.38	
<b>Colorado.</b>								
Cañon City	53.9		102	July, Aug.	1	Feb.	12.53	
Climax							20.15	
Delta	47.9		105	July, Aug.	0	Jan.	8.85	
Durango							20.27	
Fort Collins	46.4		97	July, Aug.	-16	Feb.	14.58	
Fort Crawford	49.6		99	June	-10	Jan.		
Fort Lewis	43.7		88	July	-18	Feb.	21.81	
Fort Logan	50.5		101	July				
Georgetown	42.9		84	July	2	Jan.	14.39	
Greeley	48.4		99	July	-11	Feb.	14.58	
Gunnison	38.1						10.02	
Husted			99	Aug.	-10	Jan.	14.65	
Leadville	35.4		77	July	-9	Jan., Feb.	12.80	
Monte Vista	41.1		93	July	-25	Feb.	5.72	
Palmer Lake			96	July, Aug.			22.30	
Rifle Falls							14.38	
Rocky Ford	51.2		104	July	-11	Jan.		
Thon	46.1		95	July			12.75	
T. S. Ranch	51.7		95	June, Aug.			5.71	
<b>Connecticut.</b>								
Canton			92	May	-8	Feb.	54.26	
Clarks Falls							60.42	
Colchester	49.6		88	May	-3	Feb.		
Fort Trumbull	51.8		93	July	2	Feb.	47.11	
Hartford	49.7		93	Sept.	-2	Feb.	55.09	
Mansfield	47.6		86	June, July	-6	Feb.	50.26	
Middletown	49.3	+ 1.9	88	{ May } { June } { July }	0	Feb.	50.27	+11.44
New Hartford	43.4		92	June	-10	Feb.	54.47	
Shelton	49.5		89	May	1	Feb.	61.13	
Southington	49.5						54.64	
Thompson	47.8		89	May	-7	Feb.		
Voluntown	49.9		86	June, July	-2	Feb.	59.45	
Waterbury	49.2		90	May, June	-2	Feb.	55.86	
Wallingford							63.12	
<b>California.</b>								
Alameda	66.4		114	July	29	Feb.	25.99	
Alcatraz Island	55.6		88	Sept.	38	Feb.	37.25	
Almaden	62.4		97	Sept.	31	Jan.	32.74	
Anaheim	66.2		104	July	34	Jan.	24.52	
Anderson	64.6		110	July	27	Feb., Dec.	61.91	
Angel Island	59.1		95	Sept.	30	Feb.	35.36	
Aptos	58.0		86	Sept.	30	Jan.	37.94	
Athlone	65.7		114	July, Aug.	26	Feb.		
Auburn	62.0		106	June	27	Jan.	38.97	
Barstow	63.3		112	July	19	Jan.	6.23	
Beaumont	64.7		113	July	30	Feb.	23.59	

## Annual summary for 1889—Voluntary stations.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
California—Continued.	°	°	°		°		Inches.	Inches.
Bakersfield	69.2		112	July	28	Feb	7.03	
Benicia Barracks	59.4		100	Sept	28	Feb	29.06	
Berkeley	55.7		87	Sept			31.97	
Borden	64.5		114	July	30	Jan, Feb	12.25	
Brentwood	65.8		105	July	26	Feb	25.10	
Brighton	64.4		106	Aug., Sept.	30	Jan	24.93	
Byron	65.0		108	July	26	Feb	22.97	
Cactus	79.2		122	July, Aug.	39	Feb		
Caliente	67.1		112	July	28	Jan	10.59	
Calistoga	58.8		104	July	21	Feb	49.31	
Castroville	57.2		84	Sept	32	Jan, Feb	26.86	
Chico	65.6		115	Aug.	27	Feb	29.82	
Cisco	47.4		88	Jcly	3	Feb		
Colfax	59.1		102	July	22	Feb	69.09	
Colton	66.1		114	July	22	Feb	18.13	
Colegrove							33.40	
Corning	64.8		111	July	30	Jan, Feb	27.09	
Davis	63.6		107	Aug, Sept.	27	Feb	30.42	
Delano	68.4		112	July	25	Feb	8.11	
Delta	60.8		109	July	24	Feb	111.05	
Downey	64.1		96	Sept	29	Feb		
Dunnigan	63.7		105	July	27	Jan	29.91	
Dunsmuir	54.0		110	July	22	Jan	68.00	
El Dorado	63.5		106	July	27	Feb	47.04	
Elmira	65.0		110	July, Aug.	28	Feb	26.63	
Emigrant Gap	49.7		90	July	10	Feb		
El Verano	58.8		102	Sept	28	Jan, Feb	47.32	
Evergreen							23.93	
Esperanza	63.1		108	July, Sept.	30	Jan, Feb	28.48	
Farmington	63.5		110	July	28	Feb	20.19	
Florence	64.0		98	Sept	34	Jan	24.41	
Folsom	64.7		109	July	27	Jan	33.98	
Fort Bidwell	50.2		99	July	— 3	Jan	23.39	
Fort Mason	55.6		85	Sept	37	Feb	35.23	
Fresno	71.0		112	Aug	29	Jan		
Fruto	66.6		113	July	28	Feb	33.38	
Gilroy	59.5		102	Sept	28	Jan, Feb	26.86	
Girard	59.8		100	Aug.	26	Jan, Feb	14.97	
Goshen	67.2		110	July	23	Feb	11.54	
Hollister	60.6		101	Aug, Sept.	29	Jan, Feb	19.23	
Ione	61.5		104	July	24	Jan	12.46	
Keene	60.0		104	July	20	Feb		
Kingsburgh	66.9		112	July	30	Jan	12.46	
Kings City	57.0		105	June, Aug.	25	Jan, Feb	24.13	
Knight's Landing	61.8		104	July	32	Jan		
Lathrop	61.3		106	July, Aug.	30	Jan, Feb	17.36	
Lemoore	67.7		111	July	30	Jan, Dec.	11.71	
Lewis Valley	67.2		110	July	24	Feb	15.51	
Livermore	59.0		98	( July ) ( Aug. ) ( Sept. )	29	Dec	24.56	
Livingston	65.3		110	July	29	Feb		
Los Angeles	63.1		104	Aug.	28	Jan		
Los Gatos			100	Sept	29	Jan, Feb	49.93	
Mammoth Tank	76.1		120	July	28	Dec	5.48	
Marysville	68.4		105	July	34	Jan		
Menlo Park	59.2		96	July, Sept.	32	Jan, Feb	26.99	
Merced	64.3		108	July, Aug.	26	Feb	12.78	
Modesto	65.2		106	July	28	Feb	13.16	
Mojave	67.1		116	Sept	26	Jan		
Montague	61.0		104	July	0	Jan		
Monterey	58.8		88	Sept	28	Feb	25.14	
Napa	58.6		98	July	28	Jan	34.84	
Newark			96	Sept	30	Dec	27.91	
Newman	64.0		110	July	30	Jan, Feb	20.13	
Niles	62.1		96	Sept	32	Feb, Dec.	26.10	
Oakland	57.5		90	Sept	34	Jan	34.84	
Orland	68.5		112	July	28	Feb	25.05	
Oroville	64.4		103	July	32	Jan	40.61	
Pajaro	58.4		88	Sept	28	Feb	31.26	
Petaluma	58.6		99	Sept	25	Feb	36.61	
Placerville	59.8		103	July	25	Feb	58.45	
Pomona	67.0		102	July	34	Feb	31.58	
Porterville	68.8		110	June, Aug.	27	Feb	10.66	
Presidio of San Francisco	55.3		90	Sept	31	Feb	34.96	
Puente	63.7		104	July	28	Jan, Feb	27.84	
Red Bluff	65.4		110	July	31	Jan	31.43	
Redding	64.2		115	July	30	Jan, Feb		
Riverside							18.03	
Rocklin	64.2		113	July	29	Jan	26.89	
Rumsey	64.6		112	Aug.	30	Jan, Feb	38.60	
Sacramento (1)	61.0		95	July	31	Jan	23.49	+13.13
Sacramento (2)	56.1		96	July	23	Feb	31.13	
Salinas (1)							22.59	
Salinas (2)	55.9		82	Sept	28	Jan	19.71	
San Ardo	59.7		106	Aug.	28	Jan, Feb	23.41	
San Diego Barracks	62.8		92	Sept	26	Jan		
San Gabriel	65.6		106	July	30	Jan, Feb	30.26	
San José	59.4		95	Sept	32	Jan, Feb	25.53	
San Mateo	57.5		90	July, Aug.	34	Jan, Feb	33.21	
San Miguel	60.4		104	Aug., Sept.	23	Feb	18.96	
Santa Ana	65.5		100	Aug., Sept.	32	Feb	23.13	
Santa Barbara (1)	63.5		98	Sept	34	Feb	35.27	
Santa Barbara (2)	60.5		107	July	35	Jan	32.77	
Santa Monica	63.0		91	Sept	26	Jan		
Santa Rosa	57.9		90	July, Sept.	25	Feb	43.42	
Santa Maria			100	Sept	28	Jan, Feb	23.63	
Santa Paula	65.4		108	Sept	38	Jan, Feb	35.88	
Sanger Junction	67.7		116	July	25	Feb	16.00	
Seven Palms	77.2		120	July, Aug.	37	Jan, Feb		
Sims	55.8		100	June	20	Jan		
Sission	51.2		98	Aug.	11	Jan	58.91	

## Annual summary for 1889—Voluntary stations—Continued.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
<i>California—Continued.</i>	°	°	°		°		Inches.	Inches.
Soquel	60.4		92	Sept	30	Jan., Feb.	21.71	
South Side	61.4		106	July, Aug.	36	Jan.	27.16	
South Vallejo	55.6		83	Sept	31	Feb.	26.22	
Spadra	62.5		109	Aug.	31	Feb.	29.84	
Suisun	61.9		103	Aug.	32	Feb.	39.26	
Summit	43.4		96	Aug.	—1	Dec.	32.01	
Susanville	52.8		110	July	18	Feb.	39.26	
Tehachapi	57.3		100	July	18	Jan.	39.26	
Tehama	65.8		115	July	34	Feb.	32.01	
Templeton	60.0		106	July	13	Feb.	17.86	
Towles	58.0		98	July	12	Feb.	13.65	
Tracy	61.8		108	July, Aug.	29	Jan., Feb.	11.71	
Traver	66.0		111	July	26	Feb.	17.41	
Tropico	62.4		103	July	26	Jan., Feb.	38.05	
Tulare	68.3		113	July	30	Jan., Feb.	26.80	
Turlock	65.0		107	Aug.	30	Dec.	26.19	
Vacaville	60.2		107	Aug.	30	Jan., Feb.	26.12	
Valley Springs	64.2		101	July	30	Jan.	35.18	
Volcano Springs	78.1		126	July, Aug.	30	Jan.	14.97	
Westley	67.2		105	July, Aug.	31	Jan.	10.26	
Wheatland	61.2		106	July			8.45	
Whittier	67.3		109	Sept.	39	Jan., Dec.	18.00	
Willow	61.8						11.75	
Winters	67.5		110	July	30	Feb.	17.41	
Woodland	66.2		100	July	39	Jan.	22.65	
<i>Dakota.</i>								
Davenport	41.6		96	July	—38	Feb.	21.87	
Fort Abraham Lincoln	41.9		104	Aug.	—30	Feb.	38.02	
Fort Bennett	46.1		108	July, Aug.	—27	Feb.	18.88	
Fort Buford	42.9		104	June	—34	Feb.	16.68	
Fort Meade	45.9		100	Aug.	—20	Feb.	38.60	
Fort Pembina	38.2		97	July, Aug.	—43	Feb.	53.44	
Fort Randall	49.2		105	July	—24	Feb.	57.89	
Fort Sully	48.4		108	July	—22	Feb.	41.22	
Fort Totten	41.4		98	Sept.	—36	Feb.	36.15	
Fort Yates			107	Aug.	—26	Feb.	42.96	
Gallatin	37.4		102	July	—44	Feb.	38.12	
Kimball	42.9		99	June, Aug.	—24	Feb.	52.68	
New England City	40.6		104	June	—33	Feb.	44.76	
Parkston	43.9		100	July	—28	Feb.		
Spearfish	45.4		101	June	—16	Feb.		
Webster	44.2		100	Aug.	—33	Feb.		
Wolsey	42.6		105	July	—34	Feb.		
Woonsocket	43.6		104	July	—30	Feb.		
<i>Delaware.</i>								
Kirkwood	52.8				4	Feb.		
<i>Florida.</i>								
Altamonte Springs	70.2		95	July	34	Jan.	56.53	
Alva	71.6		99	June, July	35	Nov.	56.30	
Fort Barrancas							62.63	
Fort Meade	68.1		91	{ May .. } { June .. }	32	Jan.	43.36	
Homeland	72.2						38.60	
Manatee	71.7		93	June, Aug.	36	Nov.	53.44	
Merritt's Island	70.5	—1.3	93	May	38	Jan.	57.89	+1.40
St. Francis Barracks	68.1						41.22	
Tallahassee			95	July	36	Jan., Feb.	36.15	
Villa City	70.6		98	July	35	Jan.	36.15	
<i>Georgia.</i>								
Andersonville	68.9		108	Aug.	19	Feb.	42.96	
Athens			94	May, July	15	Feb.	38.12	+6.74
Forsyth (near)	65.9	+0.8	95	July	20	Feb.	52.68	
Marietta	68.8		91	July	13	Feb.	44.76	
Milledgeville	62.6		95	July	18	Feb.		
Quitman					28	Feb.		
<i>Idaho.</i>								
Boise Barracks	51.2		103	July	3	Jan.	8.12	
Fort Sherman	48.6		94	July	3	Dec.	18.41	
Lewiston	35.0		101	July	10	Jan.	10.73	
<i>Illinois.</i>								
Beason	30.3		94	May	—6	Feb.	34.54	
Belvidere	47.4		97	June	—15	Feb.	23.80	
Centralia	54.7		96	July	0	Feb.	46.16	
Collinsville	35.0		94	July	—1	Feb.		
Dwight			98	Aug.	—13	Feb.	33.83	
Golconda	37.2		92	June, July	8	Feb.	41.18	
Grand Tower							37.85	
Greenville	33.2		93	July	—1	Feb.	37.37	
Griggsville	53.3		94	May, June	—4	Feb.	31.42	
Hennepin			96	July	—7	Feb.	31.42	
Lacon	31.2		94	Aug.	—8	Feb.	30.67	
Lake Forest	46.1		90	July, Aug.	—13	Feb.	31.56	
Lanark	48.7		92	Aug.	—12	Feb.	31.17	
Mattoon	52.2		96	July	—2	Feb.	38.62	
Olney	53.0		95	July	3	Feb.	46.27	
Oneida	50.4		98	Aug.	—10	Feb.	28.31	
Oswego	47.5		94	Aug.	—12	Feb.	28.58	
Ottawa	30.2		93	July, Sept.	—11	Feb.	34.27	
Palestine	54.0		92	July	1	Feb.	38.04	
Pann	55.0		94	July	—4	Feb.	42.92	
Pekin	52.7		96	June, July	—10	Feb.	36.08	
Peoria	52.9		94	July	—5	Feb.	35.05	
Philo	51.3		96	June	—5	Feb.	39.54	
Pontiac	50.0		98	Aug.	—8	Feb.	28.12	
Riley	46.2		91	Aug.	—15	Feb.	24.52	
Rockford	47.6		92	July, Aug.	—14	Feb.	29.88	
Rock Island Arsenal	50.1		92	Aug.	—11	Feb.	41.63	
Sandwich	51.4		95	July	—10	Feb.	31.15	
Sycamore	46.8		93	July	—11	Feb.	24.96	
Watseka	49.6		95	July	—7	Feb.	36.69	
White Hall	54.8		94	Aug.	—3	Feb.	39.13	

## Annual summary for 1889—Voluntary stations—Continued.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
<i>Illinois—Continued.</i>	°	°	°		°		<i>Inches.</i>	<i>Inches.</i>
Winnebago	48.8		96	Aug.	—16	Feb.	28.05	
<i>Indiana.</i>								
Angola	50.4		97	July	—10	Feb.	32.86	
Blue Lick	54.8		90	May	4	Feb.	38.46	
Butlerille	53.7				0	Feb.	40.63	
Cannelton	55.1		95	June	8	Feb.	36.37	
Columbus	52.5		90	June, July	3	Feb.	33.26	
Columbia City	48.0		93	July, Aug.	—1	Feb.	30.38	
Connersville	58.4		90	July, Sept.	1	Feb.	31.79	
Dana	52.1		93	Aug., Sept.	—4	Feb.	31.83	
De Gonia Springs	55.1		98	June, July	7	Feb.	42.99	
Delphi	49.8		92	July	—3	Feb.	33.19	
Evansville							44.39	
Farmland	52.0		94	Sept.	2	Feb.	29.84	
Fort Sheridan	46.2		95	Aug.	—17	Feb.		
Franklin	52.3				0	Feb.	35.41	
Huntingburg	55.8		94	July	4	Feb.	53.67	
Huntington							29.00	
Jeffersonville	55.9		92	June, July	7	Feb.	38.51	
La Fayette	50.2		95	July	—8	Feb.	34.10	
Logansport							36.41	—4.06
Marengo	56.8		93	Aug.	9	Feb.	65.17	
Marion	49.9		92	July	—1	Feb.	23.00	
Mauzy	48.9		96	July	3	Feb.	36.90	
Mount Carmel							40.62	
Mount Vernon	55.0		94	July	5	Feb.	43.30	
Muncie	52.0		96	July	0	Feb.		
Princeton	54.8		96	July	8	Feb.	44.10	
Richmond	49.7		91	July, Sept.	1	Feb.	35.04	
Rockville	52.5		94	July, Sept.	—4	Feb.	42.55	
Rushville							37.34	
Scarsville	57.0		94	May	6	Feb.	45.55	
Seymour	52.8		90	May	4	Feb.	40.24	
Spiceland	52.8		90	July	0	Feb.	39.12	
Sunman	51.7		92	July	1	Feb.	40.35	
Vevay	55.2	—0.2	94	{ May .. } { July .. } { Sept .. }	5	Feb.	40.25	—3.01
Vincennes							48.02	
Worthington	51.8		88	May	0	Feb.	41.88	
<i>Indian Territory.</i>								
Caddo Creek	63.3		98	Aug.	5	Jan.		
Eufaula							34.54	
Fort Gibson	60.3		100	July	8	Jan.	33.09	
Fort Reno	59.6		103	July	6	Feb.	31.91	
Fort Supply	57.6		111	July	—1	Feb.	23.61	
Tulsa							26.28	
<i>Iowa.</i>								
Amara	47.7		94	July	—14	Feb.	27.75	
Ames	49.9		94	Aug.	—16	Feb.	24.19	
Bancroft	45.4		95	July	—24	Feb.	13.66	
Belle Plaine	48.5						27.03	
Cedar Rapids	48.1		95	July	—15	Feb.	30.18	
Clarinda	50.5		93	July	—6	Feb.	24.44	
Clinton	48.1		86	July	9	Feb.	31.98	
Cresco	44.0	+1.9	94	Aug.	—27	Feb.	23.33	—8.61
Elkader	46.9		94	July, Aug.	—22	Feb.	25.71	
Fayette	45.3		97	Aug.	—25	Feb.	25.74	
Fort Madison	45.3		95	July	—7	Feb.	33.82	
Glenwood	53.1		98	July	—11	Feb.	25.80	
Grinnell	48.0		90	July, Aug.	—14	Feb.	29.90	
Hampton	45.2		94	Aug.	—22	Feb.	24.29	
Humboldt							21.14	
Independence	47.2		92	July	—18	Feb.	24.52	
Iowa City	49.1		91	July	—11	Feb.	27.03	
Logan	51.0	+2.5	98	June	—11	Feb.	30.29	—5.63
Manson	47.5		94	July	—22	Feb.	26.26	
Maquoketa			96	July			28.49	
McGregor	46.6		100	July, Aug.			23.75	
Monticello	47.8	+1.9	95	July	—18	Feb.	26.28	—10.76
Mount Pleasant	49.6		99	July	—6	Feb.	30.39	
Mount Vernon	50.1		96	July	—18	Feb.		
Muscatine	49.6		94	July	—9	Jan.	33.47	
Osage							19.29	
Oskaloosa	52.0						25.00	
Sac City	45.3		90	Aug.	—17	Feb.	28.17	
Storm Lake	46.3						23.68	
Vinton	47.2		91	July, Aug.	—16	Feb.	22.39	
Washington	53.0		96	{ June .. } { July .. } { Aug. .. }	—9	Feb.	27.00	
Wesley	44.3		94	July	—28	Feb.	14.30	
<i>Kansas.</i>								
Allison	49.0		99	July	—4	Feb.	23.86	
Bendena	54.5		98	June	7	Feb.	28.08	
Bucklin							20.60	
Bunker Hill			106	July	—5	Feb.	27.01	
Burr Oak			97	July			23.02	
Cawker City	54.2		93	May	—10	Feb.	26.15	
Concordia	52.1		92	{ May .. } { July .. } { Aug. .. }	—12	Feb.	34.46	
Conway			96	July	—5	Feb.	35.65	
Cunningham	53.6		99	July	—4	Feb.	31.25	
Elk Falls			97	Aug.	0	Feb.	36.09	
Englewood	56.8		102	June, July	4	Feb.	24.59	
Fort Leavenworth	54.4						36.61	
Fort Riley	53.9		98	July	—10	Feb.	30.47	
Globe	53.1		93	July	—5	Feb.	38.24	
Grenola	55.7		102	July	—4	Feb.	34.40	



Annual summary for 1889—Voluntary stations—Continued.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
<b>Kansas—Continued.</b>	°	°	°	°	°	°	Inches.	Inches.
Halstead	54.7		96	July	-6	Feb.	30.06	
Havensville	52.0		99	July	-14	Feb.	42.60	
Independence	56.1		101	July	-4	Feb.	44.55	
Junction City							38.97	
Kirwin							26.27	
La Harpe	5.0				1	Feb.		
Lawrence	53.3	-0.2	94	July	-6	Feb.	45.22	+10.26
Lebo	54.3		98	July	-6	Feb.	43.80	
Lisbon	55.1		108	July	-10	Feb.	44.94	
Macksville	54.1		100	July	-10	Feb.	25.72	
Manhattan (1)	51.8						30.87	
Manhattan (2)	48.2						33.06	
Monument	50.7		108	July	-10	Feb.	19.20	
Morse	50.2		90	June, July	-10	Feb.	39.88	
Oakley	50.3		106	July, Aug.	-5	Feb.		
Oberlin	54.0						19.60	
Offerle	56.6		100	July	-6	Feb.	39.18	
Rome	56.6		100	July	-4	Feb.	32.70	
Salina	56.6		103	July	-2	Feb.	37.05	
Sedan	52.1		95	Sept.	-16	Feb.	38.90	
Seneca	52.8						35.21	
Topeka	57.0		105	July	-15	Feb.	35.12	
Toronto	51.5		100	July	-8	Feb.	36.29	
Tribune							14.55	
Wakefield							38.16	+6.11
Wallace	55.8	+1.3	98	Aug.	-5	Feb.	25.70	
Wellington	54.4		101	July	-5	Feb.	35.20	
Wilson	53.8		96	July	-6	Feb.		
Yates Centre								
<b>Kentucky.</b>								
Ashland	50.0				4	Feb.	36.76	
Bowling Green	59.9		94	July	9	Feb.	40.42	
Catlettsburgh							35.72	
Eddyville							35.80	
Falmouth	52.5		92	July	8	Feb.	37.60	
Frankfort (1)	54.5		96	Aug.	7	Feb.	41.36	
Frankfort (2)							44.68	
Franklin	53.7		92	Sept.	21	Jan., Feb.	44.30	
Greensburg							38.80	
Mount Sterling	53.0		90	July	8	Feb.	37.33	
Newport Barracks	54.1		98	Sept.	6	Feb.	38.70	
Owenton	54.6		94	July	3	Feb.	36.30	
Padenah							36.50	
Pellville							36.50	
Richmond	56.4		97	July	5	Feb.	39.59	
Shelbyville	55.4		95	Aug.	6	Feb.		
South Fork	55.4		90	July	8	Feb.		
<b>Louisiana.</b>								
Abbeville	67.7		90	July	32	Jan.	39.53	
Alexandria	67.5		97	July			37.84	
Amite City	66.6		94	July			38.01	
Baton Rouge							40.61	
Cameron			104	Sept.	31	Jan., Feb.	42.00	
Clinton	64.6		99	July	21	Jan.	38.22	
Coushatta Chute			98	July			44.54	
Crowley	66.8		93	July	27	Jan.	41.70	
Delhi							44.62	
Donaldsonville							38.92	
Farmerville	64.3		94	July, Aug.	26	Jan., Feb.	34.29	
Girard							38.32	
Grand Cane			95	July	21	Jan.	45.56	
Grand Coteau	67.9	-0.7	93	July	33	Jan.	44.91	-20.59
Hammond	63.9		97	July	26	Nov.	43.60	
Houma	67.2		94	July	31	Dec.	54.27	
Kenner							52.90	
Lake Charles	68.5		100	June, July		Dec.	36.37	
Liberty Hill	65.7		100	Aug.	22	Jan.	44.86	
Luling							39.69	
Mandeville	68.3		97	July	28	Nov.	34.62	
Marksville	65.2		96	July	28	Nov.	19.55	
Maurepas	67.0		97	July	26	Nov.	38.86	
Melville			97	July	27	Dec.	36.70	
Minden			96	July	22	Jan., Feb.	27.73	
Monroe	64.8		99	July	25	Feb.	43.43	
Mount Airy	67.7		96	July	35	Jan.	35.20	
New Iberia			95	July, Oct.	33	Jan., Nov.	36.99	
Plaquemine	65.2		97	Sept.	23	Dec.	40.35	
Port Eads	69.7		92	July			41.00	
Shell Beach	69.0		93	July	32	Jan.	34.80	
Thibodaux							41.34	
Vidalia	67.6		100	July, Aug., Sept.	24	Feb.	33.01	
<b>Maine.</b>								
Bar Harbor	45.7		87	June	-9	Feb.	42.19	
Belfast	46.0		82	June	-9	Feb.		
Cornish	46.0		91	May	-14	Feb.	42.96	
Fairfield	43.8		91	May	-14	Feb.	35.73	
Gardiner	45.9		93	May	-17	Feb.	41.55	
Kent's Hill	45.2		92	June	-23	Feb.	45.32	
Lewiston	44.9		89	May	-23	Feb.	47.31	
Orono	45.1		89	May	-23	Feb.	42.94	
Petit Menan	43.9		80	July, Aug.	-5	Feb.		
West Jonesport	43.8							
<b>Maryland.</b>								
Barren Creek Springs	56.0		89	May, June	11	Feb.	63.21	
Cumberland	53.4	+2.5	90	May	0	Feb.	40.17	+8.25
Fort Mchenry	55.1		90	May, June	3	Jan.	66.36	
Frederick	54.1		92	July	3	Jan.	51.83	

Annual summary for 1889—Voluntary stations—Continued.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
<i>Maryland—Continued.</i>								
Gaithersburgh.....	49.6	o	o		o	Feb.....	Inches.	Inches.
Galena.....	54.9				5	Feb.....	59.96	
Jewell.....	55.7				6	Feb.....	65.70	
McDonogh Institute	53.8		89	July.....	1	Feb.....	59.91	
<i>Massachusetts.</i>								
Amherst (1).....	49.3	+ 1.3					47.30	+ 5.16
Amherst (2).....	47.8		90	May.....	- 9	Feb.....	43.82	
Amherst (3).....	49.4						46.11	
Blue Hill (summit).....	47.3		89	May.....	- 6	Feb.....	54.60	
Blue Hill (base).....	49.0		90	May.....	- 4	Feb.....	55.30	
Blue Hill (valley).....	49.0		92	May.....	- 4	Feb.....	54.30	
Brewster.....	50.7		88	July.....	5	Feb.....	48.67	
Cambridge (1).....	49.1						43.75	
Cambridge (2).....	49.9						50.21	
Chestnut Hill.....	49.9		92	May.....	- 4	Feb.....	54.79	
Clinton.....							42.04	
Cotuit.....	49.6		84	June.....	- 2	Feb.....	48.45	
Deerfield (1).....	48.9							
Dudley.....	48.1		92	May.....	- 9	Feb.....	32.12	
Fall River.....	50.0		85	June.....	- 2	Feb.....	62.54	
Fiskdale.....							42.24	
Fitchburg (1).....	47.7						45.70	
Fitchburg (2).....	48.1						47.99	
Fort Warren.....	49.0		89	May.....	- 1	Feb.....	44.55	
Framingham.....	49.9		93	May.....	- 5	Feb.....	53.08	
Gilbertville.....	47.9		89	June.....	- 7	Feb.....	53.08	
Groton (1).....	49.1		91	May.....	- 10	Feb.....	53.03	
Holyoke.....	50.9		94	June.....	- 4	Feb.....	45.28	
Lake Cochituate.....	49.1		97	May.....	- 8	Feb.....	49.99	
Lawrence.....	49.4		96	May.....	- 7	Feb.....	48.07	
Leicester.....	48.4		89	May, June.....	- 9	Feb.....	45.67	
Leominster.....							48.22	
Long Plain.....			86	June.....	o	Feb.....	61.28	
Lowell (1).....	48.8						46.77	
Lowell (2).....	48.9							
Ludlow.....	46.6		90	May, June.....	- 8	Feb.....	48.89	
Lynn.....	48.6		85	May.....	- 1	Feb.....	55.99	
Mansfield.....	48.8		89	June.....	- 7	Feb.....	59.04	
Medford.....							51.02	
Middleborough.....	49.1		87	June.....	- 4	Feb.....	51.50	
Milton.....	48.8		88	May, June.....	- 1	Feb.....	53.79	
Mystic Lake.....							51.54	
Mystic Station.....							50.99	
New Bedford (1).....	49.5						53.71	
New Bedford (2).....	49.7		83	July.....	- 5	Feb.....	52.99	
Newburyport (1).....	48.8	+ 2.2	92	May.....	- 4	Feb.....	53.00	+ 6.95
North Billerica.....			95	May.....	- 6	Feb.....		
Northampton.....	50.0		92	June.....	- 9	Feb.....	53.56	
Plymouth.....	51.8		88	May, June.....	o	Feb.....	49.04	
Princeton.....	46.1		90	May.....	- 12	Feb.....	50.92	
Randolph.....							52.79	
Royalston.....			92	June.....	- 4	Feb.....		
Salem (1).....	50.0		90	May.....	- 1	Feb.....	57.95	
Somerset.....	52.0	+ 2.5	96	June.....	- 6	Feb.....	46.40	+ 11.00
South Hingham.....					- 6	Feb.....	57.95	
Springfield.....	50.6						46.40	
Taunton (1).....	50.0						50.83	
Taunton (2).....	49.8						57.33	
Taunton (3).....	49.3						57.04	
Waltham.....							53.09	
Wellesley.....	49.8		91	June.....	- 6	Feb.....	56.55	
Westborough.....			98	May.....	- 5	Feb.....	46.45	
Winchester.....							50.12	
Williamstown.....	46.5		85	May.....	- 14	Feb.....	35.92	
Worcester.....	49.9							
<i>Michigan.</i>								
Adrian.....	46.6		94	Aug. { July .. } Aug. { Sept. }	- 12	Feb.....	27.89	
Alma.....	44.5		92	{ Aug. { Sept. }	- 24	Feb.....	26.50	
Allegan.....							32.83	
Ann Arbor.....	47.8		93	June.....			23.34	
Arbela.....							24.02	
Atlantic.....	39.0		92	July.....	- 24	Feb.....	26.99	
Bangor.....	49.2							
Bear Lake.....	43.7		90	July.....	- 10	Feb.....	31.36	
Bell Branch.....	46.7				- 10	Feb.....	32.37	
Berrien Springs.....			96	July.....				
Big Rapids.....	44.4		91	July.....	- 27	Feb.....	26.62	
Birmingham.....	47.0		94	July.....	- 18	Feb.....	23.82	
Bronson.....	43.9				- 8	Feb.....	27.88	
Buchanan.....	47.1		89	Aug., Sept.....	- 9	Feb.....	39.91	
Calumet.....	39.0		87	July.....	- 23	Feb.....	31.19	
Cassopolis.....	48.0		92	July.....	- 8	Feb.....	34.30	
Charlevoix.....	43.3		92	July.....	- 10	Feb.....	27.21	
Chelsea.....	47.5		90	July, Aug.....	- 9	Feb.....	24.26	
Concord.....	47.4		92	July, Aug.....	- 7	Feb.....	27.24	
Colon.....	44.7				- 6	Feb.....	32.68	
Deer Lake.....	45.6		98	Aug.....	- 26	Feb.....	24.57	
Eden.....			91	May, July.....	- 15	Feb.....	23.59	
Escanaba.....	42.5	+ 2.4					26.77	- 7.31
Fort Brady.....	40.2		87	July.....	- 23	Feb.....	31.61	
Fort Wayne.....			94	July.....	- 7	Feb.....	25.92	
Fort Mackinac.....	41.4		82	July.....	- 18	Feb.....		
Fremont.....	46.2				- 12	Feb.....	26.69	
Fitchburgh.....							24.51	
Flint.....	45.9		93	July.....	- 22	Feb.....	21.84	
Grand Rapids.....	47.0		89	May.....	- 13	Feb.....	27.52	
Gulliver Lake.....	40.9				- 20	Feb.....	33.92	
Hanover.....	47.8		90	July.....	- 8	Feb.....	25.68	
Harrisville.....	32.7		95	July.....	- 23	Feb.....	32.69	
Hart.....	46.9		95	July.....	- 20	Feb.....	28.78	

## Annual summary for 1889—Voluntary stations—Continued.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
Michigan—Continued.								
Hastings	47.3		91	July	-12	Feb.	23.32	
Highland Station	46.6		98	July	-15	Feb.	21.74	
Hillman	42.3		95	July, Aug.	-17	Feb.	24.58	
Hillsdale	47.5		90	May	-10	Feb.	23.19	
Hudson	46.5		92	July	-10	Feb.	27.09	
Ivan	42.8		94	Aug.			26.59	
Jeddo	40.1		95	July	-14	Feb.	20.95	
Kalamazoo	48.9	+ 1.3	90	July, Aug.	-11	Feb.	28.30	- 9.
Lansing	47.3		91	Aug.	-15	Feb.	22.74	
Lathrop	40.6		102	July	-33	Feb.	28.38	
Madison	46.1				-8	Feb.	26.23	
Marshall	48.7		94	July	-8	Feb.	28.78	
Montague	44.5		90	Sept.	-12	Feb.	25.94	
Mottville	47.8		92	Sept.	-10	Feb.	25.81	
North Aurelius							26.92	
North Marshall	46.2		90	Aug., Sept.	-10	Feb.	25.77	
Olivet	46.0		90	{ June Aug. Sept. }	-14	Feb.	25.61	
Ovid	45.5		93	July	-18	Feb.	22.90	
Pontiac	48.2		86	July	-10	Feb.	22.62	
Paw Paw	47.0		94	Aug.	-19	Feb.	35.13	
Pulaski	46.9				-4	Feb.	24.27	
Roscommon	41.8		96	July	-33	Feb.	26.04	
Saint Johns	46.3		92	July, Aug.	-12	Feb.	24.88	
Stanton	45.7		93	Aug.	-20	Feb.	26.98	
Stockbridge							15.62	
Thornville	48.3	+ 0.9	92	July, Sept.	-23	Feb.	34.36	- 9.59
Traverse City	44.6						35.91	
Vandalia	45.1				-10	Feb.	28.77	
Vienna							33.19	
Washington	45.2		90	July	-19	Feb.	23.13	
Weldon Creek							25.58	
West Branch	42.4		91	July			30.59	
Williamston	48.2		90	Aug.	-12	Feb.	27.33	
Ypsilanti School	48.4						25.01	
Ypsilanti	46.5						29.46	
Minnesota.								
Alexandria							16.98	
Farmington	45.1		100	July	-26	Feb.	23.07	
Fergus Falls							15.87	
Fort Ripley							14.86	
Fort Snelling	44.8		100	July	-29	Feb.	14.81	
Grand Meadow	43.6		99	Aug.	-30	Feb.	17.77	
Lake Winnibigosh. Dam.	39.4		91	June	-40	Feb.	21.30	
Le Sueur	45.4		95	July	-26	Feb.		
Mankato	45.7		93	July	-25	Feb.	19.16	
Minneapolis	44.4	+ 2.7	99	July	-26	Feb.	18.36	-12.12
Morris	45.1		94	Aug.	-36	Feb.	18.30	
Northfield	44.4				-27	Feb.	20.63	
Ortonville							17.74	
Pine River Dam	39.7		96	July	-44	Feb.	20.86	
Pokeyama Falls			92	June			25.65	
Red Wing	44.6				-25	Feb.	18.98	
Redwood Falls							16.12	
Rolling Green	44.1		94	Aug.	-24	Feb.	15.81	
Tracy							10.14	
Mississippi.								
Agricultural College							44.97	
Batesville							41.57	
Canton	62.5		100	July	13	Feb.	34.08	
Kosciusko			93	June, Sept.	23	Nov.	22.49	
Lock Haven			98	July	28	Jan., Nov.	38.36	
Logtown	67.2		94	July	29	Nov.	47.91	
Louisville	64.6		102	Sept.	18	Nov.	38.94	
Pearlington	67.8		94	July, Sept.	29	Nov.	46.53	
Pontotoc	60.8		92	May	19	Feb.	41.23	
Summit			93	June, July	24	Jan., Feb.		
University	69.1						42.87	
Water Valley			100	July	18	Feb.	39.43	
Waynesborough	62.9						37.33	
Yazoo City							36.94	
Missouri.								
Excelsior Springs	31.4		97	July	-7	Feb.	39.84	
Fayette	34.6						42.56	
Frankford							43.16	
Glasgow	32.8		99	July	-8	Feb.	42.07	
Grand Pass	33.0		94	July	-4	Jan.	40.31	
Harrisonville	33.0		97	July	-7	Feb.	42.49	
Hermann							39.69	
Ironton	56.8		91	July	-4	Feb.	43.65	
Jefferson Barracks	33.1		100	Aug.	-10	Feb.	30.00	
Kansas City	34.8		98	July	-10	Feb.	42.24	
New Frankfort								
New Haven	39.5				-3	Feb.	40.85	
Oregon	32.5				-6	Feb.	39.83	
Princeton	35.2		99	Aug.	-6	Feb.	32.25	
Saint Charles (1)							31.93	
Saint Charles (2)	33.1							
Sedalia	36.8		100	July, Aug.	-7	Feb.	37.74	
Shelbina							42.26	
Warrensburg	32.2						41.41	
Withers Mill							38.43	
Montana.								
Camp Poplar River	41.6		103	June	-35	Feb.	13.32	
Galpin							6.72	
Custer Station							1.78	
Fort Assiniboine	44.7		99	June	-29	Feb.	9.40	
Fort Custer	46.0		100	June, Aug.	-24	Feb.	7.51	
Fort Keogh	45.3		104	June	-23	Feb.	9.94	
Fort Maginnis	47.2		96	June, Aug.	-23	Feb.	14.00	
Fort Missoula	43.6		96	July	-21	Jan.	9.15	

## Annual summary for 1889—Voluntary stations—Continued.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
<i>Montana—Continued.</i>								
Fort Shaw	46.6	+ 1.4	95	June, July	-23	Jan	4.93	- 5.36
Sheldon			95	June	-17	Jan		
Virginia City	43.8		92	June, July	-11	Feb.	7.08	
<i>Nebraska.</i>								
Ansley	47.9		105	July	- 9	Feb.	19.76	
Ashland			98	July	-20	Feb.	33.40	
Crete	51.0		95	July	-16	Feb.	29.06	
Creighton	45.6		102	July	-27	Feb.	23.55	
Culbertson							20.62	
David City							23.34	
De Soto	50.0		96	July	-11	Feb.	20.42	
Fairbury			96	July	- 6	Feb.	27.78	
Falls City	52.0		97	July	-12	Feb.	30.93	
Fort Niobrara	46.3		110	July	-16	Feb.	18.16	
Fort Robinson	48.9		106	July	-17	Feb.	13.90	
Fort Sidney	48.3		109	July	-10	Feb.	14.66	
Fremont	50.4		96	July	-20	Feb.	22.14	
Genoa	49.2		99	July	-19	Feb.	20.94	
Hay Springs	45.2		104	July	-20	Feb.	19.16	
North Loup	47.6		100	July	-10	Feb.	23.43	
Minden			98	July	-16	Feb.	41.01	
Nebraska City					-12	Feb.	23.20	
Oakdale	46.5		99	July	-26	Feb.	16.92	
Palmer	46.7		100	July	-10	Feb.	26.05	
Ravenna			98	July	- 8	Feb.	24.12	
Syracuse	51.5		95	July	- 8	Feb.	23.54	
Tecumseh			94	July	-15	Feb.		
Weeping Water	48.9		100	July	-12	Feb.	30.82	
<i>Nevada.</i>								
Carson City (1)	50.9		101	July	-11	Dec.	12.44	
Carson City (2)	51.8		101	July	- 7	Jan	12.71	
Crane's Ranch	56.9						10.23	
El Dorado Canyon	73.7		119	July	32	Feb.	11.04	
Elko	49.2						12.12	
Ely	47.8		99	July	-15	Jan	13.54	
Eureka	49.2		106	July	-11	Jan	9.29	
Genoa	50.6		98	July	0	Jan	23.68	
Humboldt	50.3						5.09	
Lewers' Ranch	52.0		100	July	1	Feb.	23.10	
Palisade	50.5		110	July			7.09	
Pioche			104	July	- 6	Jan	27.35	
Reno	51.2						7.56	
Tunacoma	45.8		98	July	-10	Jan	19.88	
Verdi	50.7		105	July			16.34	
<i>New Hampshire.</i>								
Antrim							45.85	
Belmont							42.64	
Berlin Falls	40.9		97	July				
Berlin Mills	45.4		94	May	-28	Feb.	38.79	
Bristol							44.02	
Concord	47.6		92	May	-14	Feb.	40.98	
Hanover	45.1	+ 2.4	89	July	-25	Feb.	37.51	+ 0.98
Lake Village							46.07	
Manchester (1)	48.4						42.03	
Manchester (2)	48.5						42.60	
Manchester (3)	48.1						36.94	
Mine Falls							43.10	
Nashua	48.4		95	May	- 8	Feb.	42.33	
North Conway			94	May	-21	Feb.	45.80	
Pennichuck Station							39.69	
Plymouth	44.7		96	May	-24	Feb.	44.17	
Stratford	46.3		97	May	-27	Feb.	36.14	
Shaker Village	45.0		90	June	-10	Feb.	38.84	
Walpole	44.0		88	May	-16	Feb.	43.42	
Weirs Bridge							40.87	
West Milan	41.7		94	May	-44	Feb.	36.25	
Wolfborough							41.91	
<i>New Jersey.</i>								
Allaire	53.2		90	May, Aug.				
Beverly	52.5		92	May	2	Feb.	57.13	
Bridgeton	55.9		92	July	6	Feb.	56.75	
Billingsport	54.6		93	June, July	4	Feb.		
Cape May	55.1		90	May, July	5	Feb.		
Egg Harbor City	52.5		91	May	1	Feb.	62.18	
Freehold	51.9		88	May, June, July	- 2	Feb.	70.75	
Gillette	51.5		93	July	- 2	Feb.	62.41	
Hanover			92	May	4	Feb.	65.80	
Hopewell							62.49	
Highland Park	52.2		89	July	0	Feb.	60.93	
Lambertville	53.0		90	May	3	Feb.	67.06	
Locktown	51.9		94	July	- 3	Feb.	70.06	
Madison	51.3		92	May	- 1	Feb.	66.87	
Moorestown	52.2	+ 1.1	92	July	0	Feb.	53.66	+11.16
New Brunswick (1)							61.16	
New Brunswick (2)	52.8						61.44	
Newark	53.0		89	June	5	Feb.	64.99	
Ocean City	53.7		91	July	2	Feb.	56.90	
Oceanic	54.2		95	Aug.	4	Feb.	75.14	
Plainfield	51.5		92	July	- 1	Feb.	82.31	
Readington	55.3		96	July	2	Feb.		
Rancocas			90	May, July	0	Feb.	54.07	
South Orange	50.8	+ 0.3	90	May, July	0	Feb.	80.81	+14.93
Tenafly	50.9		94	May			72.81	
Trenton	55.6		92	July	- 2	Feb.	67.23	
Union	51.0		92	July	0	Feb.	66.75	
Woodbury	54.3		92	July	4	Feb.	54.46	
<i>New Mexico.</i>								
Coolidge			100	June, July	-19	Feb.		
Deming	64.1		110	July	12	Feb.		
Fort Bayard			95	July, Aug.	6	Jan		



Annual summary for 1889—Voluntary stations—Continued.

Annual summary for 1889—Voluntary stations—Continued.

State and station.	Temperature—degrees Fahrenheit.					Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.
			Max.	Month.	Min.	Month.	
<i>New Mexico—Continued.</i>	°	°	°		°		Inches.
Fort Seldon.	109		July	—9	Dec	12.06	
Fort Union.	90		July	—10	Jan	13.11	
Gallinas Spring.	57.5		July	—8	Jan	18.42	
Las Vegas.	48.6		July, Aug.	—11	Jan	11.59	
Springer.							
<i>New York.</i>							
Amersand.	42.5		91	May	—34	Feb	42.42
Angelica.	44.9		89	May	—22	Feb	43.22
Ardensia.	51.4		89	May	—5	Feb	51.04
Boyd's Corner.	50.7		93	May, June.	—2	Feb	54.29
Canton.	43.4		92	July	—35	Feb	43.31
Carmel.	50.1						50.48
Central Park.	52.5						50.18
Constableville.	46.2		89	May	—25	Feb	50.49
Cooperstown.	44.9		86	May	—15	Feb	50.57
Eden.	49.0		92	May	—2	Feb	59.66
Elmira.			90	May, July.	—7	Feb	39.92
Factoryville.	46.9		89	May	—15	Feb	39.99
Fleming.	48.0		98	Sept.	—13	Feb	39.99
Geneva.	48.0		96	May	—13	Feb	39.99
Hess Road Station.	47.3		91	July	—9	Feb	38.13
Humphrey.	46.7		89	May, Sept.	—16	Feb	45.21
Ilion.	46.6		93	May	—20	Feb	43.12
Ithaca.	47.3		92	May	—12	Feb	41.64
Kingston.	46.9		95	July, Aug.	—4	Feb	48.79
Lowville.							48.79
Lyons.	47.6		92	July	—3	Feb	39.41
Middleburgh.	47.9		94	May	—22	Feb	38.55
Nineveh.	46.9		94	May	—30	Feb	54.71
North Hammond.	45.8		94	July	—22	Feb	35.19
Number Four.	41.2		88	May	—27	Feb	35.18
Palermo.	45.8	+ 1.7	89	May	—9	Feb	36.42
Palmyra.	45.7		94	May	—9	Feb	34.42
Pendleton.	45.0						52.39
Potsdam.	44.0		90	May	—26	Feb	46.86
Perry City.	45.0		91	July	—14	Jan	41.90
Queensbury.	49.8						49.19
Roudout.	51.8		88	May	—5	Feb	53.87
Setauket.	46.5		90	May	—12	Feb	48.10
South Canisteo.	46.5		94	May, July.	10	Feb	49.55
South Kortright.	46.6						49.93
Utica.	47.0		100	July	—23	Feb	48.19
Wedgwood.	47.0		93	July	—12	Feb	44.66
White Plains.	51.6		85	July	—4	Feb	61.50
<i>North Carolina.</i>							
Asheville (1).	55.4		91	July	6	Feb	38.76
Asheville (2).	55.0						38.92
Charleston.	56.1	+ 0.8	89	May	8	Feb	48.10
Lenoir.	59.1		94	May, July.	10	Feb	49.55
Mount Pleasant.	60.2						49.93
Monroe.	59.8						48.38
Murphy.	59.8						58.25
Salisbury.	58.3						33.96
Weldon.							34.83
<i>Ohio.</i>							
Akron.	49.4		96	Sept.	—5	Feb	34.50
Ashland.	52.1		92	July, Sept.	—3	Feb	35.40
Athens.	48.6		93	July	—6	Feb	30.12
Bangorville.	50.0		94	July	—3	Feb	40.08
Bellevue.	51.8		91	May	—1	Feb	30.81
Canton.	51.7						36.71
Celina.	51.7		95	Sept.	—7	Feb	31.88
Circleville.	50.9		92	July	—7	Feb	32.00
Clarksville.	50.9		95	Aug.	—2	Feb	44.54
Cleveland.	55.4		98	July	0	Feb	26.76
College Hill.	53.4		94	July	—1	Feb	35.67
Columbus Barracks.	50.6		88	July, Sept.	0	Feb	34.43
Dayton.	50.5		95	July	—4	Feb	36.37
Demos.	50.5		91	July	—15	Feb	39.37
Elyria.	46.6		100	Aug.	6	Feb	32.78
Garrettsville.	53.9						38.26
Georgetown.	50.2		88	(May ..)	0	Feb	35.29
Greenville.				(Aug. ..)			25.62
Hanging Rock.	52.6		93	(Sept. ..)	6	Feb	30.46
Hiram.	47.3		90	Aug., Sept.	—13	Feb	35.14
Jacksonborough.	52.5		94	May	0	Feb	39.30
Jefferson.	47.0		91	Sept.	—14	Feb	29.21
Kenton.	50.2		94	May	—3	Feb	39.95
Logan.	51.8		97	July	3	Feb	34.18
Lordstown.	48.8		92	July	—12	Feb	34.82
Marietta.	53.5		90	(July ..)	3	Feb	33.49
McConnelsville.	52.6		95	(Aug. ..)	0	Feb	31.05
Napoleon.	51.3		96	(Sept. ..)	0	Feb	28.54
New Alexandria.	50.1		92	July	—3	Feb	28.69
New Comerstown.	50.1		96	July	—4	Feb	28.64
North Lewisburgh.	52.4	+ 2.0	96	July	—3	Feb	32.25
Oberlin.	48.9		90	July	—4	Feb	38.53
Ohio State University.	51.2		93	Aug., Sept.	1	Feb	28.92
Ottawa.	50.5		96	July	8	Feb	27.37
Pomeroy.	54.2		94	July	8	Feb	33.71
Portsmouth.	50.8						21.32
Springborough.	51.6		91	July	—4	Feb	35.33
Tiffin.	51.6		96	July	—13	Feb	29.64
Upper Sandusky.	48.3	+ 0.9	94	Aug.	—13	Feb	29.18
Wapakoneta.	50.1		92	July	0	Feb	
Waynesville.							
Westerville.							

State and station.	Temperature—degrees Fahrenheit.					Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.
			Max.	Month.	Min.	Month.	
<i>Ohio—Continued.</i>	°	°	°		°		Inches.
West Milton.	55.1		98	May, July	2	Feb	52.33
Weymouth.	48.6		92	July, Sept.	—5	Feb	36.10
Wooster.	51.5		90	May, July	—2	Feb	39.97
Yellow Springs.	50.8		93	May	—8	Feb	39.08
Youngstown.							32.72
<i>Oregon.</i>							
Albany.	54.1		97	Sept.	22	Jan	33.84
Ashland.	55.5		98	June.			17.81
Astoria.	53.2						65.03
Bandon.	52.4		98	June.	26	Feb	59.09
Cascade Locks.	53.7		96	July	20	Feb	50.06
East Portland.	53.6	+ 2.5	94	July	18	Dec	24.90
Eola.							28.54
Gardiner.							61.27
Jacksonville.							18.04
Lone Rock.							10.85
Mount Angel.	54.2		96	July, Sept.	22	Jan	33.92
The Dalles.	52.8						7.51
Tillamook.	53.1		85	July	14	Dec	68.87
Vancouver Barracks.	53.2						29.19
<i>Pennsylvania.</i>							
Allegheny Arsenal.			94	July, Sept.	—3	Feb	
Altoona.	54.0		93	July	—3	Feb	37.03
Blooming Grove.			92	July	—12	Feb	
Coatesville.	51.0		94	May, July.	—3	Feb	68.94
Columbus.	46.8						39.77
Corry.	46.5		92	Aug., Sept.	—26	Feb	39.77
Doylstown.							66.67
Dyberry.	45.0	+ 1.3	89	July	—20	Feb	45.72
Easton.							63.97
Edinborough.	46.9		87	July	—21	Feb	
Emporium.	50.4		93	July	—20	Feb	47.89
Forks of Nesheim.	51.3						61.72
Frankford Arsenal.	46.7		95	July	—2	Feb	
Franklin.			90	July	—23	Feb	43.78
Frederick.							60.27
Germantown.	52.6		88	(May ..)	1	Feb	57.80
Girardville.	49.9		95	(June ..)			
Grampian Hills.	47.7	+ 2.5	94	(July ..)	—4	Feb	70.27
Hollidaysburg.	49.9		95	July	—24	Feb	53.58
Honesdale.	46.2		86	July	—7	Feb	45.23
Huntingdon.	49.9		93	May	—15	Feb	49.19
Lansdale.							49.35
New Bloomfield.	50.0		94	July	0	Jan., Feb.	65.10
Ottaville.							52.61
Philipsburgh.	45.9		94	July	—19	Feb	71.09
Point Pleasant.	53.1		92	July	—19	Feb	46.72
Pottstown.	50.0		92	July	0	Feb	65.88
Quakertown.	50.6		92	July	—4	Feb	71.32
Reading.	49.7		95	June	—4	Feb	68.92
Rimersburgh.	49.7		92	July	—13	Feb	65.02
Salem Corners.	46.0		90	May	—7	Feb	
Seisholtzville.							55.34
Selins Grove.	52.2		92	May	—4	Feb	68.30
Smith's Corner.							56.33
Somerset.	46.8		92	May	—13	Feb	68.73
State College.	48.0		90	July	—14	Feb	51.33
Swarthmore.	51.0		91	July	0	Feb	44.76
Troy.			95	July	—16	Feb	58.36
Uniontown.	53.0		89	July, Sept.	—1	Feb	
Wellsborough.	45.9		90	May, July	—20	Feb	53.96
West Chester.	51.9		90	May, July	—2	Feb	60.45
Wysox.	47.5		91	July	—15	Feb	73.00
<i>Rhode Island.</i>							
Bristol.	50.4		86	July	0	Feb	41.38
Kingston.							51.48
Lonsdale.							65.53
Newport.	51.0		82	July	1	Feb	53.61
Olneyville.	53.2		92	May	—2	Feb	
Pawtucket.							58.49
Providence.	51.3						53.91
Woonsocket.	49.7						55.45
<i>South Carolina.</i>							
Camden.	58.2						49.77
Cedar Springs.	58.9		95	(May ..)	16	Feb	46.04
Clinton.	60.6		96	(June ..)	23	Jan., Feb.	41.00
Columbia.	63.8		96	July	17	Feb	47.76
Kirkwood.	57.9				4	Feb	49.57
Statesburgh.	62.0	— 0.3	95	May	19	Feb	47.79
Timmonsville.	64.2		94	May	24	Feb	42.40
Trial.	60.2		96	July	20	Feb	51.13
Winnaborough.	61.3		99	June	10	Feb	49.65
Yorkville.	61.7		94	(May ..)	11	Feb	43.83
<i>Tennessee.</i>							
Andersonville.	57.0		90	May	9	Feb	53.93
Ashwood.	59.1		92	July	14	Feb	50.07
Austin.	59.8	+ 0.2	92	July	9	Feb	45.73
Clarksville.	58.7		91	Aug.	11	Feb	35.76
Covington.	60.4		89	July	18	Feb	45.58
Fayetteville.	60.2		95	July	12	Feb	40.18
Florence Station.	58.9		88	May, July	15	Feb	47.02
Greeneville.	54.9		86	July	9	Feb	36.10
Hohenwald.	57.1		97	July	6	Feb	55.18
Jacksboro.	56.7		88	July	8	Feb	50.72
Kingston Springs.	57.1		93	July	7	Feb	41.36
Leeville.	60.0		96	July	8	Feb	38.79

## Annual summary for 1889—Voluntary stations—Continued.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
Tennessee—Continued.								
Milan.....	58.5	+ 1.7	92	July, Aug.	14	Feb.	42.93	- 3.69
Nunnally.....	57.5		93	July.....	7	Feb.	52.47	
Parksville.....	58.6		91	July.....	11	Feb.	39.64	
Ridgely.....	55.5		89	{ July .. May .. Sept. }	8	Feb.	54.98	
Rogersville.....	56.3		93	July.....	8	Feb.	37.43	
Trenton.....	57.5				14	Feb.	45.74	
Watkins.....	59.7		97	July.....	10	Feb.	35.31	
Waynesborough.....	57.4		90	Sept.....	18	Feb.	50.09	
Texas.								
Austin.....	68.3							
Brady.....	63.6		97	July, Aug.	18	Feb.	31.44	
Brasoria.....	67.1		93	July.....	30	Jan.	53.90	
Brenham.....	70.0		101	July.....	27	Feb.	41.09	
Brownwood.....	64.9		101	July.....	18	Feb.	34.70	
Camp Peña Colorado.....			102	June, July	9	Jan.	21.59	
Columbia.....	69.4		99	July, Aug.	32	Jan.	42.03	
Decatur.....	62.4		98	July, Aug.	16	Jan., Feb.	39.50	
Eagle Pass.....	70.0							
Edinburg.....							29.85	
Fort Bliss.....	64.0		107	July.....	18	Feb.		
Fort Brown.....			95	July, Aug.	35	Jan.		
Fort Clark.....	66.7		103	June.....	11	Jan.	30.54	
Fort Davis.....	61.2		96	June, Aug.	11	Jan.	11.34	
Fort Elliott.....	58.5		106	July.....	3	Feb.	19.23	
Fort Hancock.....	61.3		111	July.....	10	Jan., Feb.		
Fort McIntosh.....			104	June, July	28	Jan.		
Fort Ringgold.....	73.0		110	July.....	25	Jan.	21.67	
Fort Worth.....			95	July, Aug.	19	Feb.		
Gallinas.....	67.4		101	July.....	32	Jan.	31.67	
Huntsville.....	68.0		99	July.....	26	Jan.	39.20	
La Grange.....	67.6				26	Feb.	51.12	
Lampasas.....	65.9		98	July.....	22	Jan.		
Longview Junction.....	66.2		100	July.....	24	Jan.	53.62	
Mesquite.....	65.2		101	Aug.....	12	Jan.	47.46	
New Braunfels.....	65.8		101	July.....	25	Jan.	45.95	
New Ulm.....	68.0	- 0.2	97	July.....	27	Feb.	41.80	- 15.14
Panther.....								
San Antonio.....	68.9		106	July, Aug.	29	Jan.		
Silver Falls.....			104	July.....	8	Feb.		
Waco.....	67.1		100	July, Aug.	21	Feb.	40.05	
Utah.								
Blue Creek.....			109	June, July	3	Jan.		
Camp Douglas.....	52.9		103	July.....	5	Jan.	18.66	
Corinne.....	53.5		105	July.....	4	Jan.		
Fort Du Chene.....	46.0		103	July.....	22	Jan.	6.26	
Kelton.....	53.6		110	July.....	12	Jan.		
Ogden.....	52.4		98	June, July	4	Jan.		
Price.....							5.45	
Terrace.....			104	July.....	10	Jan.		
Vermont.								
Brattleborough (1).....	48.4						48.95	
Brattleborough (2).....	47.2							
Burlington.....	48.3		90	May.....	15	Feb.	38.21	
Chelsea.....	42.1		83	May.....	21	Feb.	46.34	
Cornwall.....							38.48	
East Berkshire.....	43.0		94	May.....	35	Feb.	45.54	
Jacksonville.....	44.4		93	May.....	30	Feb.	52.53	
Lunenburg.....	45.8		95	May, June	26	Feb.	40.07	
Saint Johnsbury.....	42.0		92	May.....	31	Feb.		
Stratford.....	45.9	+ 1.5	90	May.....	20	Feb.	47.45	+ 7.32
Vernon.....	48.5		96	June.....	20	Feb.	52.59	
Virginia.								
Birdnest.....	57.6	- 0.7	90	June, July	1	Feb.	71.35	+ 26.67
Christianburgh.....			92	July.....	37	Feb.	32.32	
Dale Enterprise.....	56.6		103	July.....	1	Feb.	52.54	
Fort Monroe.....	58.1		92	{ June .. May .. July .. }	15	Feb.	68.38	
Fort Myer.....	54.5		95	July.....	9	Feb.	59.39	
Petersburgh.....	56.4		90	June.....	10	Feb.	61.33	
Spottsville.....	57.0		98	June.....	10	Feb.	71.85	
Smithfield.....	57.4		90	July.....	10	Feb.	72.25	
Summit.....	52.7		90	June, July			61.66	
Washington.								
Fort Spokane.....	50.0		102	July.....	8	Jan.	12.93	
Fort Townsend.....	51.0	+ 0.9	88	July.....	34	Feb., Dec.	15.00	- 5.41
Fort Vancouver.....	53.6		95	July.....	19	Jan.	29.53	
Fort Walla Walla.....	52.8		102	July.....	8	Jan.	13.73	
Fort Blakely.....	51.6		91	July.....	23	Feb.	29.79	
Vashon.....	52.3		92	July.....	23	Feb.	32.44	
West Virginia.								
Buckhannon.....							54.54	
Charleston.....							48.29	
Morgantown.....							49.03	
Rowlesburgh.....							35.74	
Tyler Creek.....			98	July.....	5	Feb.		
Weston.....							44.48	
Wheeling.....							31.51	
Wisconsin.								
Cadis.....					- 12	Feb.		
Chippewa Falls.....							21.52	
Embarras.....	44.9		93	July.....	36	Feb.	33.75	
Fond du Lac.....	45.3		91	Aug.....	23	Feb.	28.15	
Madison.....	40.4	+ 1.2	92	July.....	20	Feb.	20.17	- 16.77

## Annual summary for 1889—Voluntary stations—Continued.

State and station.	Temperature—degrees Fahrenheit.						Precipitation in inches.	
	Mean annual.	Departure from normal.	Extremes for 1889.				Total for 1889.	Departure from normal.
			Max.	Month.	Min.	Month.		
Wisconsin—Continued.								
Manitowoc	46.4		90	July, Aug.	-21	Feb.	28.52	
Phillips							23.37	
Portage							24.89	
Wyoming.								
Camp Pilot Butte	44.8		97	July, Aug.	-30	Jan.	4.31	
Camp Sheridan	40.9		91	July, Aug.	-15	Feb.	20.63	
Fort Bridger					-34	Jan.		
Fort D. A. Russell	43.5		100	July	-23	Feb.		
Fort Laramie			106	July	-21	Feb.	10.83	
Fort McKinney	47.1		95	June	-13	Feb.	5.27	
Fort Washakie	43.0		94	July	-24	Feb.	8.40	

The following reports were received too late to be used in preparing the charts and discussion:

California.							
Felton	59.4	102	Sept.	24	Jan., Feb.	79.54	
Fort Gaston	53.9	110	July	13	Feb.	56.88	
Galt	62.7	106	July	28	Jan.	25.08	
Georgetown		99	July	24	Feb.		
Glen Ellen	58.4	103	July	24	Feb.	62.51	
Hornbrook	57.7	107	July	2	Jan.	13.34	
Indio		116	Aug.	30	Jan.		
Keeler	62.9	107	July	24	Feb.		
La Grange	64.8	114	Aug.				
Laurel	60.2	101	Aug.	28	Feb.	84.14	
Long Beach	64.1	97	Aug.	39	Feb.		
Norwalk	58.2	99	July, Aug.	28	Jan., Feb.	26.94	
Selma		110	July, Aug.	29	Jan.		
Stockton		98	July, Sept.	34	Jan., Feb.		
Truckee	48.8	98	July	12	Dec.	19.16	
Upper Mattole	56.8					101.25	
Williams		115	July	30	Dec., Feb.		
Georgia.							
Hephzibah	55.2	90	July	26	Feb.	41.44	
Illinois.							
Fort Sheridan	46.3	95	Aug.	-17	Feb.		
Iowa.							
Blakeville	46.3	104	Aug.	-21	Feb.	28.58	
Kansas.							
Buffalo Park		106	Aug.	- 2	Feb.		
Collyer		104	June	- 2	Feb.		
Dorrance		104	July	-10	Feb.		
Ellsworth		102	July	- 4	Feb.		
Emporia	54.3	97	July	- 5	Feb.	35.97	
Fort Leavenworth (Military Prison)	52.5	92	June	- 6	Feb.		
Gorham		104	July	-12	Feb.		
Grainfield		99	Aug., Sept.	- 2	Feb.		
Grinnell		108	Aug.	- 4	Feb.		
Hays City		108	July	- 0	Feb.		
Kanopolis		100	July	- 9	Feb.		
McAlister		108	July	-17	Feb.		
Ogallah		102	July	- 8	Feb.		
Quinter		104	Aug.	-10	Feb.		
Russell		98	July	- 8	Feb.		
Victoria		103	July	- 6	Feb.		
Winona		102	July	- 4	Feb.		
Maine.							
Kennebec Arsenal	45.0	90	May	- 1	Dec.	29.19	
Massachusetts.							
Heath	47.6	92	{ June, } July, } { Aug., }	-20	Feb.		
Monson		92	May				
New York.							
David's Island	50.8	90	May, July	- 1	Feb.	60.65	
Fort Columbus	52.2	91	July	1	Feb.	55.92	
Fort Hamilton	52.6	87	July	2	Feb.	52.16	
Fort Niagara	49.1	93	July	- 6	Feb.	28.82	
Fort Porter	46.6	89	May	-11	Feb.	38.96	
Fort Schuyler	51.7	88	July	0	Feb.	55.01	
Fort Wadsworth	52.8	92	May, July	1	Feb.	60.41	
Madison Barracks	44.8	92	May	-26	Feb.	55.73	
Plattsburgh Barracks	46.3	92	May	-25	Feb.	30.09	
Watervliet Arsenal	48.6	92	May	- 8	Feb.	49.78	
West Point	49.3	89	July	- 4	Feb.	56.70	
Willetts Point	52.0	88	May	1	Feb.	55.93	
Nevada.							
Battle Mountain	51.7	102	July	- 6	Jan.	5.67	
Beowawe	52.6	102	July	-19	Dec., Jan.	4.43	
Brown's	60.1	110	July	0	Jan.	3.00	
Carlin	48.5	108	July	-24	Jan.	10.75	
Fenelon	51.6	100	Sept.	-13	Dec.	9.99	
Goconda	56.0	104	July	-10	Jan.	3.30	
Hallock	48.9	110	July	-20	Jan.	8.52	
Hot Springs	53.8	115	July	0	Dec.		
Tecoma	52.9	104	July	-10	Jan.		
Toano	51.9	103	July	-10	Dec.	12.82	
Winnemucca	51.4	102	July	-14	Jan.	6.57	
Texas.							
Camp Eagle Pass	70.0	106	June	20	Jan.	29.47	
College Station	68.3	104	July	24	Feb.	50.68	



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*List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for the Monthly Weather Review. Reports have not been received from those marked with an asterisk (\*) in time to be used in the Review for December, 1889.*

Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.
<p><b>ALABAMA.</b> Auburn, Ala. Weather Service. Bermuda, Wm. Fowler. Citronelle, J. G. Michael. Columbiana, W. D. Lovett. Double Springs, A. M. Weller. Livingston, Prof. J. W. A. Wright. *Mount Willing, W. M. Garrett. Valley Head, E. P. Nicholson, M. D. Wiggins, M. D. Jones.</p> <p><b>ARIZONA.</b> Antelope Valley, Mrs. J. H. Hamilton.</p> <p><b>ASH CANON, Jno. S. Robbins.</b> Ash Creek, Jno. H. Hudson. Ash Spgs (Benson), J. D. Kinnear. Bangharta, Geo. Banghart. Bisbee, Rev. J. G. Fritchard. Buckeye, W. E. Hurley. Cedar Springs, B. E. Norton. Cooler, C. C. Cooler. *Chiricahua Mountains, D. D. Ross. Dos Cabezas, T. C. Bain. Dragoon, J. W. Graham. *Eagle Pass, Dr. R. B. Tripp. Fairbank, S. W. Wood. Flagstaff, M. J. Riordan. Florence, A. T. Colton, C. E. Gila Bend, D. Murphy. *Globe, J. H. Hamilton. Holbrook, David Roper. Lochiel, Mrs. Alice F. Cameron. Mount Huachuca, J. W. Stump. *New River, J. F. Singleton. Phoenix, S. H. Campbell. *Seligman, R. O. Le Grand. Signal, Henry Koshland. 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Weldon, T. A. Clark.</p> <p><b>NORTH DAKOTA.</b> Davenport, J. W. Leach. Gallatin, S. J. Pound. Napoleon, J. H. Hoof. New England City, E. S. Clough. Steele, F. B. Hill. Wahpeton, O. I. Croft.</p>

List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for Monthly Weather Review—Cont'd.

Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.
<b>OHIO.</b> Bellefonte, Wm. Sheffield. Belmont, P. W. Barton. Carrollton, P. M. Herold. Cleveland, G. A. Hyde. College Hill, John W. Hammitt. *Cincinnati, Wm. Smeed. Columbus, Ohio Weather Service. Demos, B. B. Ault. Elyria, C. W. Goodspeed. Garrettsville, S. M. Luther. Jacksonborough, Dr. J. B. Owsley. Kent, P. W. Elmer. Kenton, L. J. Demarest. *Leipsic, J. D. Hadermann. Lordsburg, W. S. Dean. Napoleon, Dr. T. C. Hunter. *New Athens, Jos. Holmes. North Lewisburg, H. D. Gowey. Orangeville, E. N. Hyde. Portsmouth, Dr. D. B. Cotton. Poland, Chas. Stewart. Salineville, J. W. Manning. Shanesville, John Roth. Shiloh, Peter Bowman. Tiffin, Rev. T. H. Bonedecker. Vienna, W. D. McCorkle. Wauseon, Thos. Mikesell. Westerville, Prof. John Haywood. West Milton, Luke S. Mott. Yellow Springs, Miss Elias G. Rice.  <b>OKLAHOMA.</b> Albany, John Briggs. Bandon, Geo. Bennett. Beulah, T. L. Arnold. East Portland, Dr. Geo. Wigg. Ellensburg, F. S. Moore. Eola, Thos. Pearce. Grant's Pass, Jno. G. Jessup. Heppner, Arthur Smith. Jordan Valley, J. H. Blackaby. *La Grande, J. E. Romig. Mt. Grand, Rev. F. Barnabas Held. Portland, Oreg. Weather Service. Tillamook, A. P. Wilson.  <b>PENNSYLVANIA.</b> Altoona, Chas. B. Dudley, M. D. Aqueduct, D. M. Shelley. Blooming Grove, John Grathwohl. Blue Knob, A. H. Boyle. Catawissa, Robt. M. Graham. Corry, Wm. Loveland. *Drifcon, H. D. Miller. Dyberry, Theo. Day. Easton, Dr. J. W. Moore. Edinborough, C. F. Sweet. Franklin, Joseph Bell. Germantown, Thos. Mehan. Grantplan Hills, Nathan Moore. Haverford, H. V. Gummere. *Le Roy, Geo. W. T. Warburton. *Mcadville, David Logan. Meshoppen, Stephen S. Jenkins. Nibbet, J. S. Gibson. Petersburg, J. E. Rooney. Philadelphia, Pennsylvania Weather Service. Phillipsburg, G. F. Dunkle. Pleasant Mount, J. D. Brennan. Quakertown, J. L. Henscock. Reading, C. M. Dechant. Salem Corners, T. B. Orchard, M. D. State College, Agricultural Ex- perimental Station. Tipton, Miss C. J. Wilson. Troy, Rev. M. Gustin. Tuscarora, R. J. Mickey. 	<b>PENNSYLVANIA—Continued.</b> Wellsborough, Hiram D. Deming. West Chester, Dr. Jesse C. Green.  <b>RHODE ISLAND.</b> Kingston, C. O. Flagg.  <b>SOUTH CAROLINA.</b> Aiken, Dr. W. H. Geddings. Columbia, S. C. Weather Service. Kirkwood, Colin Macrae. Port Royal, H. D. Elliott. Spartanburg, J. F. Bayerly. Statesburg, Dr. W. W. Anderson. Simpsonville, Miss N. L. Dawson. Ashwood, Rev. C. F. Williams. Austin, P. B. Calhoun.  <b>SOUTH DAKOTA.</b> Alexandria, L. C. Taylor. *Brookings, Prof. Lewis McLouth. Canton, W. M. Cappett. Clark, W. H. Boals. De Smet, Thos. H. Ruth. Huron, Dakota Weather Service. Kimball, A. S. Stuver. Onida, Mrs. M. F. Goddard. *Roscoe, C. H. Spencer. Spearfish, J. H. Warren. Spring Lake, A. Gould. Webster, Arthur Betts. Wolsey, G. W. Frink. Woonsocket, L. O. Libbey.  <b>TENNESSEE.</b> Milan, Dr. M. D. L. Jordan. Nashville, State Board of Health. Riddleton, F. K. Fergusson.  <b>TEXAS.</b> Austin, Oscar Samosts. Austin, Q. C. Smith, M. D. Bear Creek Ranch, W. H. Potter. *Benjamin, T. J. Kenan. Braxton, H. Stevens. Brownwood, J. F. Mayo. Childress, G. H. Chipman. Cleburne, P. J. Norwood. Coldwater, J. W. O'Brien. College Station, Prof. Duncan Adair. Colorado, Fred R. Blount. Corsicana, W. H. Hamilton. Decatur, H. D. Donald. Duval, J. C. Edgar. Epworth, H. Graves. Fort Worth, Jas. G. Mallett. Fredericksburg, Arthur Strieg- ler. *Gainesville, D. F. Ragdale. Gallinas, Lum Woodruff. Galveston, Tex. Weather Service. Graham, A. B. Gant. Hartley, C. F. Conklin. Howe, W. M. Smith. La Grange, Jos. Cottam. Lampasas, Dr. C. M. Ramsdell. Merkel, J. L. Vaughan. Mesquite, Silas G. Lackey. Menardville, Louis Runge. New Braunfels, Paul Wiprecht. New Ulm, C. Runge. *Peens City, C. H. Merriman. Panhandle, J. L. Gray. Panter, E. H. Snider. Round Rock, W. Weiss. Silver Falls, C. M. Tilford. *Snyder, A. C. Wilmett. Sugar Land, W. P. Martin.  <b>UTAH.</b> Beaver, Rev. J. D. Gillilan. Levan, A. B. Larsen. 	<b>UTAH—Continued.</b> Loses, Ephraim Caffall. *Moab, Henry Crouse. Mount Carmel, Robert Moncur. Mount Pleasant, Hans C. Davidson. Nephi, W. B. May. Richfield, Neils Anderson. Saint George, Seth A. Pymm. Alta, Bingham. Ogden, Park City. Provo, Stockton.  <b>VERMONT.</b> Brattleborough, W. H. Childs. Burlington, W. B. Gates. East Berkshire, H. B. Lovering. Hartland, Rev. A. Hasen. Lunenburg, Dr. Hiram A. Cutting. Manchester, Rev. E. P. Wild. Saint Johnsbury, F. Fairbanks. Stratford, H. F. J. Scribner.  <b>VIRGINIA.</b> Bolar, G. F. Eakle. Birdnest, C. R. Moore. Christiansburg, H. D. Walters. Dale Enterprise, L. J. Heatwole. Lexington, Prof. H. D. Campbell. Liberty, W. N. Stone. Middletown, A. G. Prior. Mossingford, R. V. Gaines. Nottaway, Geo. Dunn. Petersburg, Jas. M. Colson, jr. Richmond, W. H. Pleasants. Smithfield, J. H. Purdie. Spottsville, B. W. Jones. Summit, J. R. Sinn. University of Virginia, James Westmouth. *Wytheville, Howard Shriver.  <b>WASHINGTON TERRITORY.</b> Blakely, R. M. Hoskinson. *Vashon, Mrs. C. B. Carpenter.  <b>WEST VIRGINIA.</b> *Clarksburg, R. T. Lowndes. Ella, Henry Reseger. Kingwood, J. E. Murdock. Pleasant Hill, D. Titchnell. Seven Pines, J. R. Shaver. Rousesburg, M. J. Conlin. Tannery, G. H. Trembly. Tyler Creek, F. M. Swann.  <b>WEST VIRGINIA—Continued.</b> Butternut, H. Beece, jr. Cadiz, B. C. Curtis. Delavan, George L. Collier. Elmira, J. E. Breed. Fond du Lac, J. C. Wedge. *Friendship, J. M. Harrison. Glasgow, Henry M. Crombie. Grantsburg, M. L. Roby, M. D. Greenwood, H. J. Thomas. *Hayward, J. M. Custard. Horicon, G. L. Carr. Honey Creek, J. A. McIntosh. Lincoln, A. J. Loose. Madison, Washburn Observatory. Manitowoc, Miss Clasina Lips. Neillsville, W. Haelett. Richmond Centre, Dr. H. M. Ludwig. Summit Lake, E. S. Koepenick. Viroqua, F. J. Bold. Wausau, G. H. Yapp. *Wausau, Hinemann Bros. *Weston, R. B. Wilkinson. Wausau, C. Rice. 	<b>WYOMING.</b> Carbon, J. A. Shannon. Evanston, Ira B. Moor. Lusk, F. S. Lusk. Saratoga, J. F. Crawford. Wheatland, M. R. Johnston.  <b>FOREIGN.</b> *Burnside, S. A., Dr. C. J. Hering. Grand Turk, West Indies, Geo. I. Gibbs. *Guantanamo, Mexico, Meteor- ological Observatory. Hamilton, Bermuda, Gen. Russell Hastings. Havana, Cuba, Dr. Enrique del Monte. Killisnoo, Alaska, Jos. Zuboff. La Logia, Mexico, J. Byrna. Leon, Mexico, Prof. M. Leal. Masatlan, Mexico, Leon P. Acosta. Mexico, Mexico, Meteorological Observatory. Monterey, Mexico, Dr. Wm. De Rye. Montreal, Quebec, C. H. McLeod. New Westminster, B. C., Capt. A. Pelee. Port au Prince, Hayti, Prof. I. Scherer. Pueblo, Mexico, Catholic Insti- tute. Topolobampo, Mexico, Capt. Jno. Bell.  <b>New stations, November, 1889.</b> Show Low, Ariz., Geo. M. Adams. *Sachse's Ranch (Wilcox), Ariz., W. Sachse. Tombstone, Ariz., C. S. Bogg. Los Gatos, Cal., F. H. McCullagh. Fruit, Colo., T. H. Breen, M. D. Washington, D. C., Deaf & Dumb Institute. Ocala, Fla., D. S. Woodrow. Camilla, Ga., Frank M. Hall. Mullan, Idaho, G. M. Wilson. Larrabee, Iowa, H. B. Stroyer. Gove, Kans., Jesse Royce. Princeton, Ky., Wm. Martindell. Leonardtown, Md., Geo. W. Joy. Brewster, Mass., F. A. Rogers. Ludlow, Mass., J. Harland. Bonnellville, Miss., A. G. Smith. Moss Point, Miss., P. E. Blumer. Palo Alto, Miss., W. H. Hill. Craig, Mo., C. F. Day. Harris, Mo., Chas. C. Swafford. Marshfield, Mo., A. L. McRae. Miami, Mo., E. B. Patton. Nevada, Mo., Prof. W. A. Buckner. Craig, Neb., E. F. Irwin. Kendall, N. Y., E. N. Hunt. Mount Airy, N. C., J. W. Ashby. Southern Pines, N. C., Prof. H. W. Lloyd. Monroe, N. C., D. C. Anderson. Silver Lake, Oregon, U. F. Abahier. Joseph, Oregon, W. A. Leslie. Dallas, Tex., M. E. Glass. Oshkosh, Tex., A. L. Bush. Marion, Va., A. T. Lincoln. Staunton, Va., S. H. Owens. Oceania, W. Va., A. W. Cook. Oshkosh, Wis., Prof. W. N. Mum- phrey. Sundance, Wyo., Chas. S. Price.  <b>New stations, December, 1889.</b> Evergreen, Ala., W. H. Hawkins. 	<b>New stations—Continued.</b> Pine Apple, Ala., J. F. Cooper. Pruhe's Ranch, Ariz., Louis Pruhe. Walnut Ranch, Ariz., M. H. O'Con- ner. Forrest City, Ark., J. H. Bard. Mendocino City, Cal., L. A. Mor- gan. Loomis, Cal., W. G. Williams. Pasadena, Cal., H. S. Channing. Idaho Springs, Colo., W. B. Haw- kins. Vermillion, S. Dak., Prof. C. W. Fawcett. Hypoluxo, Fla., H. D. Pierce. Athens, Ga., W. P. Briggs. Jesup, Ga., R. E. Walker. Woodstock, Ill., G. D. Stillman. Pekin, Ill., Rev. J. E. Terborg. Cannelton, Ind., T. E. Huston. Spiceland, Ind., Wm. Dawson. Guthrie, Ind. T., Morris Collier. Cairo, Kans., C. C. Humphrey. Kansas City, Kan., Dr. E. R. Heath. Couthatta, La., L. M. Howard. Port Gibson, La., O. A. Carson. Lafayette, La., W. W. Wall. Minden, La., W. S. Hunter. Monroe, La., W. W. Renwick. Morris, Minn., D. T. Wheaton. Holly Springs, Miss., H. T. Bryant. Edwards, Miss., C. W. Barber. Okaloosa, Miss., S. J. Russell. Columbia, Miss., W. B. Hopkins. Lake, Miss., W. B. Jackson. Jackson, Miss., S. E. Flanagan. Appleton City, Mo., L. T. Theil- man. Kidder, Mo., F. D. Chubbuck. Oregon, Mo., Wm. Kaucher. La Luz, N. Mex., F. B. Stuart. Marshland, N. Y., R. S. Holmes. Washington, N. C., J. M. Gal- lagher. Morgantown, N. C., P. L. Murphy. New Bern, N. C., W. G. Boyd. Bucyrus, Ohio, F. L. Hopley. Haysan, Ohio, W. G. Lewis. Greenville, S. C., Sarah A. Crit- tenden. Spartanburg, S. C., J. T. Gray. Greenwood, S. C., L. R. Harry. Florence, S. C., F. H. Walsh. Chertsey, S. C., W. R. Godfrey. Cumberland Gap, Tenn., A. A. Arthur. Dyersburg, Tenn., J. F. Pickett. Arlington, Tenn., A. T. D. Eth- eridge. Grand Junction, Tenn., J. B. Irwin. Caddo Peak, Tex., D. B. McMillan. Brenham, Tex., J. G. Sloan. Columbia, Tex., J. B. Rogers. Corsicana, Tex., E. L. Gibson. Houston, Tex., D. R. Bander. Huntsville, Tex., W. Y. Barr. Hearne, Tex., W. A. Snell. Durham, Tex., A. Blum. Longview, Tex., G. W. Kreech. Paris, Tex., W. A. Logan. Tyles, Tex., C. E. Wood. Waco, Tex., W. H. Godber. Lander, Wyo., F. T. Wright. Juneau, Alaska, Rev. E. S. Willard. 

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for December, 1889.

<b>ALABAMA.</b> Mount Vernon Barracks.  <b>ARIZONA.</b> Apache, Fort. Bowie, Fort. Huachuca, Fort. Lowell, Fort. McDowell, Fort. Mojave, Fort. Verde, Fort. Whipple Barracks.  <b>ARKANSAS.</b> Hot Springs. Little Rock Barracks.  <b>CALIFORNIA.</b> Alcatraz Island. Angel Island. Benicia Barracks. Edwell, Fort. Gascon, Fort. Mason, Fort. *Presidio, San Francisco. San Diego Barracks.	<b>COLORADO.</b> Crawford, Fort. Lewis, Fort. *Logan, Fort. Lyons, Fort.  <b>CONNECTICUT.</b> Trumbull, Fort.  <b>DAKOTA.</b> A. Lincoln, Fort. Bennett, Fort. Buford, Fort. Meade, Fort. Pembina, Fort. Randall, Fort. Sully, Fort. Totten, Fort. Yates, Fort.  <b>DISTRICT OF COLUMBIA.</b> Washington Barracks.	<b>IDAHO.</b> Boise Barracks. Sherman, Fort.  <b>ILLINOIS.</b> Rock Island Arsenal. Sheridan, Fort.  <b>INDIAN TERRITORY.</b> Gibson, Fort. Reno, Fort. Bill, Fort. Supply, Fort.  <b>KANSAS.</b> *Hays, Fort. Leavenworth, Fort. Leavenworth Prison. Riley, Fort.  <b>KENTUCKY.</b> Newport Barracks.	<b>MARYLAND.</b> McHenry, Fort.  <b>MASSACHUSETTS.</b> Springfield Armory. Warren, Fort.  <b>MICHIGAN.</b> Brady, Fort. Mackinac, Fort. Wayne, Fort.  <b>MINNESOTA.</b> Snelling, Fort.  <b>MISSOURI.</b> Jefferson Barracks.	<b>NEBRASKA—Cont'd.</b> Omaha, Fort. Robinson, Fort. Sidney, Fort.  <b>NEW MEXICO.</b> Bayard, Fort. Marcy, Fort. Selden, Fort. Stanton, Fort. Union, Fort. Wingate, Fort.  <b>NEW YORK.</b> Columbus, Fort. Davids Island. Hamilton, Fort. Madison Barracks. Niagara, Fort. Plattburgh Barracks. Porter, Fort. Schuyler, Fort. Wadsworth, Fort. Watervliet Arsenal. West Point Mil. Acad'my.	<b>NEW YORK—Cont'd.</b> Willett's Point.  <b>OHIO.</b> Columbus Barracks. Klamath, Fort.  <b>OREGON.</b> Klamath, Fort.  <b>PENNSYLVANIA.</b> Allegheny Arsenal. Frankford Arsenal.  <b>RHODE ISLAND.</b> *Adams, Fort.	<b>TEXAS—Cont'd.</b> Ringgold, Fort. San Antonio, Post at.  <b>UTAH.</b> Du Chesne, Fort. Douglas, Fort.	<b>VIRGINIA.</b> Monroe, Fort. Myer, Fort.  <b>WASHINGTON TER.</b> Canby, Fort. Spokane, Fort. Townsend, Fort. Vancouver, Fort. Walla Walla, Fort.  <b>WYOMING.</b> Bridger, Fort. D. A. Russell, Fort. Laramie, Fort. McKinney, Fort. Pilot Butte, Camp. Sheridan, Camp. Washakie, Fort.
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